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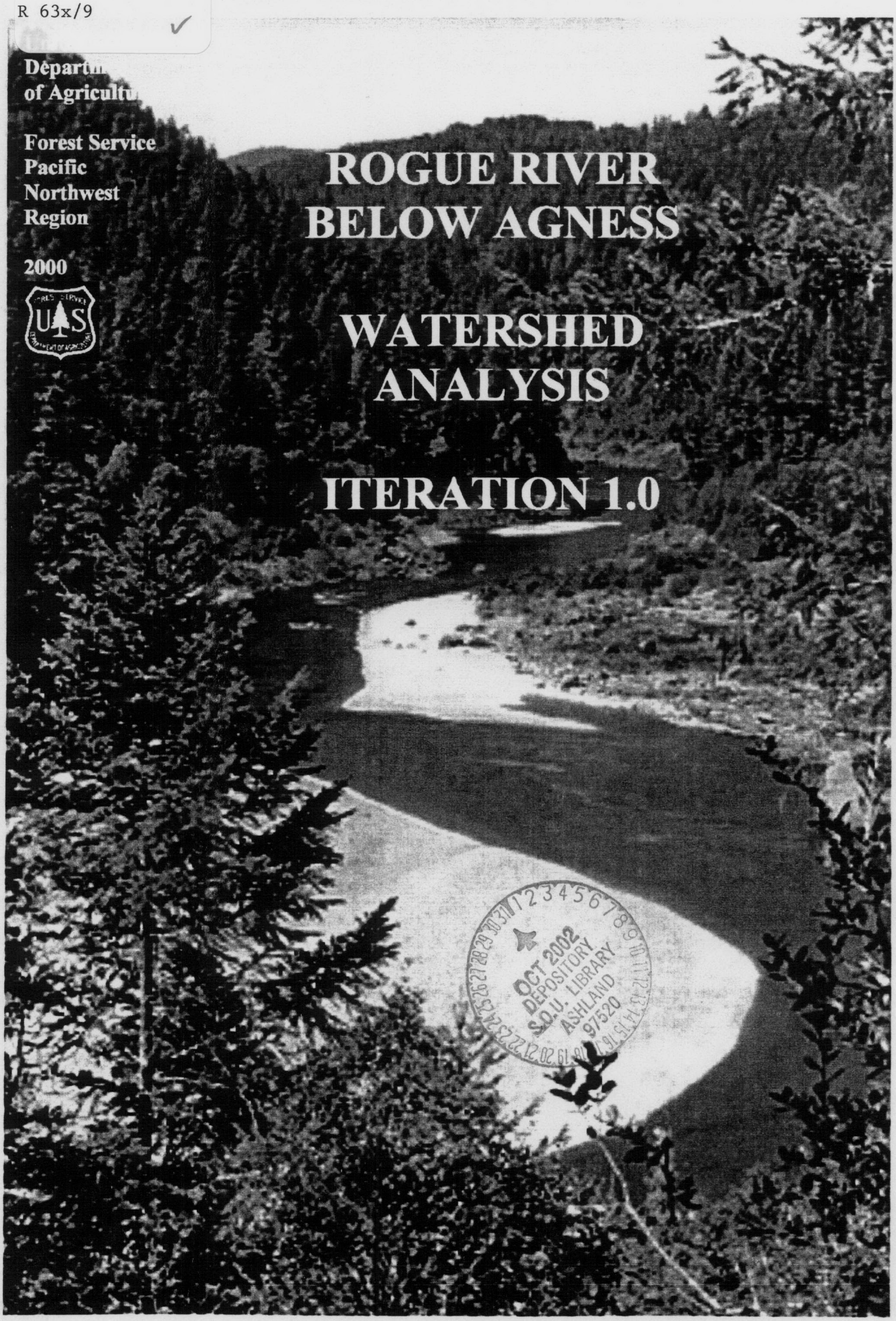

# ROGUE RIVER BELOW AGNESS

# WATERSHED ANALYSIS

# ITERATION 1.0

I have read this analysis and find it meets the Standards and Guidelines for watershed analysis required by the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI, 1994).

Signed________________________ Date______________

District Ranger
Gold Beach Ranger District
Siskiyou National Forest

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# INTRODUCTION

The Rogue River Watershed Analysis, below Agness, Iteration 1.0, was initiated to analyze the aquatic, terrestrial, and social resources of the watershed. The watershed analysis was completed by an interdisciplinary team using the six-step process outlined in *Ecosystem Analysis at the Watershed Scale (Version 2.2, August 1995).* The analysis includes the entire defined portion of the watershed, but focuses more detail on National Forest land (see Table 1 and Map 4, Land Ownership). This document has the following components: the aquatic ecosystem, the terrestrial ecosystem, and social aspects.

The information gathered and analyzed will be used to guide future resource management, and ensure that Aquatic Conservation Strategy objectives and other Standards and Guidelines contained in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI, 1994) will be met on Federal lands.

## Rogue River Basin

The Rogue River is the third largest river in Oregon, after the Columbia and the Willamette. It is one of three rivers that originate in the interior Cascade Range and flow westward to the ocean. From its source in the high Cascade Mountains in southwestern Oregon near Crater Lake National Park, the Rogue River flows over 200 miles before entering the Pacific Ocean near the town of Gold Beach, Oregon.

The Rogue River Basin contains approximately 5,160 square miles, 97 percent in Oregon and 3 percent in California. Within Oregon, the basin includes nearly all of Jackson and Josephine Counties, a large part of Curry County, lesser portions of Klamath and Douglas Counties, and a small portion of Coos County. It also includes very small portions of Siskiyou and Del Norte Counties in northwest California (see Vicinity Map and Site Map).

## Rogue River Watershed, below Agness (River Mile 27 to mouth)

This portion of the Rogue River watershed includes the Rogue River from the mouth of the Illinois River, but not including the Illinois, to the Pacific Ocean. All streams entering the Rogue River between these two points and the land drained by those streams are included in this watershed analysis except the Lobster Creek watershed. Lobster Creek is a separate fifth field watershed. The Lobster Creek Watershed analysis was completed in 1999.

**Table 1. Land Ownership**

| Ownership | Acres | Percent |
|---|---|---|
| USDA Forest Service | 44,674 | 54 |
| Private (within Forest Boundary) | 6,036 | 7 |
| Outside Forest Boundary | 32,032 | 39 |
| **Total** | **82,742** | **100** |

## Management Direction

Direction for management of the National Forest land is provided by the Siskiyou Land and Resource Management Plan (LRMP, USDA, 1989) as amended by the Record of Decision and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related species Within the Range of the Northern Spotted Owl (ROD, USDA and USDI, 1994). Management areas for National Forest lands within the Rogue River, below Agness, watershed, are listed in Table 2 and Map 5, Management Areas. The definitions and management strategy for these areas can be found in the ROD and in the LRMP.

The area addressed by the Rogue River, below Agness, Watershed Analysis includes the Quosatana Creek watershed, which was designated as a Tier 1 Key Watershed in the ROD. Detailed information concerning this watershed may be found in the Quosatana Creek Watershed Analysis (WA) completed in 1996. There are no other Key Watersheds within the Rogue River, below Agness watershed. One other Watershed Analysis covering a portion of this analysis area is Bradford Creek WA completed in 1996. Quosatana and Bradford Creeks are included in overall data and watershed descriptions, but are not analyzed in detail in this document. Interim, project-specific watershed analyses were completed on Kimball Creek and Jim Hunt Creek in 1996. Data from these analyses are incorporated in this WA. Streams that are entirely outside the National Forest boundary are included, but are not analyzed in detail.

**Table 2. Management Areas**

| Management Area | Acres | Percent |
|---|---|---|
| Botanical | 463 | 1 |
| Unique Interest | 457 | 1 |
| Supplemental Resource | 7,689 | 17 |
| Late Successional Reserve | 28,042 | 63 |
| Special Wildlife Site | 370 | 1 |
| Scenic or Recreational River | 60 | <1 |
| Riparian Reserves (in less restrictive allocations) | 1,422 | 3 |
| Partial Retention Visual | 1,853 | 4 |
| Matrix | 4,318 | 10 |
| **Total** | **44,674** | 100 |

The US Geologic Survey (USGS) divided the United States into hydrologic units codes (HUC) according to the river system the land drains into. The USGS assigned numbers to the first four 2-digit fields. This Watershed Analysis area lies within the Hydrologic Unit Code 17100310, defined as:

| | | |
|---|---|---|
| Field 1 | 17 | Pacific Northwest Region (primarily Oregon, Washington, and Idaho) |
| Field 2 | 10 | Oregon-Washington Coastal |
| Field 3 | 03 | Southern Oregon Coastal |
| Field 4 | 10 | Lower Rogue |

Other agencies have further divided these HUC watersheds into subwatersheds and smaller drainages. Agencies are moving toward a single set of boundaries and watershed numbers. At the time of this analysis, the subwatersheds included have different numbers assigned by the U.S. Environmental Protection Agency and the U.S. Forest Service (see Table 3, Subwatersheds, and Map 9, Subwatersheds and Streams).

## Table 3. Subwatersheds

| FIELD 5 EPA | FIELD 6 EPA | FIELD 5 USFS | FIELD 6 USFS | EPA NAME | STREAMS | FIELD 7 USFS |
|---|---|---|---|---|---|---|
| 08 | | 21 | | Rogue above Quosatana | | |
| | 01 | | U | Upper Subwatershed | Rilea Creek | 8 |
| | | | | | Tom Fry Creek | 7 |
| | | | | | Blue Jay Creek, | 6 |
| | | | | | Morris Rodgers Creek | 6 |
| | | | | | Painted Rock Creek | 5 |
| | | | | | Stonehouse Creek | 4 |
| | | | | | Sundown Creek | 2 |
| | | | | | Bridge Creek | 3 |
| | | | | | Nail Keg Creek | 1 |
| | 02 | | L | Lower Subwatershed | Schoolhouse Creek | 6 |
| | | | | | Tom East Creek | 7 |
| | | | | | Auberry Creek | 6 |
| | | | | | Wakeup Rilea Creek | 5 |
| | | | | | Dog Creek | 1 |
| | | | | | Slide Creek | 1 |
| | | | | | Bill Moore Creek | 4 |
| | | | | | Tom Moore Creek | 4 |
| | | | | | Bradford Creek | 3 |
| | | | | | Little Silver Creek | 1 |
| | | | | | Silver Creek | 2 |
| | | 19 | | | | |
| | 01 | | Q | Quosatana Creek | Quosatana Creek | all |
| | 02 | | F | Rogue Pacific | William Miller Creek | 4 |
| | | | | | Abe Creek | 3 |
| | | | | | Kimball Creek | 2 |
| | | | | | Jim Hunt Creek | 1 |
| | | | | | Other named streams, outside National Forest Boundary | 19F |

# KEY FINDINGS

**Major faults** in the analysis area have produced zones of sheared, fractured and deeply weathered rock. Although the faults are considered inactive today, tectonic uplift is a continuing process along the coastline of the Pacific Northwest, causing streams to actively down cut into the weaker, sheared rock. **Slope instability** is a natural outcome of the combination of weakened bedrock, high levels of precipitation common to the area, and stream incision. The most extensive **landslides** in the area occur in terrain underlain by fine-grained, metamorphic phyllite of the Colebrooke Schist. The deep-seated slump earthflows can encompass entire watersheds, with activity levels within the features from ancient inactive to recent active.

**Stream channels** in the watershed show the effects of the active terrain they flow through, both in their morphology and in their riparian condition as it changes over the period of aerial photos beginning in 1940. These natural processes may have been augmented by human activities. National Forest lands within the analysis area have received more timber harvest and road construction than typical of other watersheds on the Gold Beach Ranger District. Several Rogue tributaries (seventh fields) have high road densities and prior timber harvest. Even at the larger sixth field level, watersheds have moderately high road and harvest densities, including harvest within the transient snow zone. Stream channels appear to have recovered from any adverse effects of these human activities, but need further evaluation.

The Rogue River below Agness is **important migration habitat** for large populations of coho, fall chinook, spring chinook, winter steelhead, summer steelhead, resident and anadromous cutthroat trout. Coho are Threatened and all of these species are designated Sensitive by the Forest Service.

The mainstem Rogue River below Agness is primarily **migration habitat**. The estuary is important rearing and smolting habitat for all species.

Lobster and Quosatana Creeks are the largest tributaries to the Rogue River below Agness. They provide most of the **salmon and trout spawning and rearing habitat** downstream of Agness. They are addressed in separate Watershed Analyses.

The small tributaries of the Rogue River below Agness are generally too steep and short to provide **fish habitat**. They provide cool water to the mainstem Rogue River, which is important to juvenile fish during summer. The mouths of these tributaries also provide backwater habitat during high winter flows, where fish can escape powerful storm flows in the mainstem.

**Fisheries restoration** opportunities include prevention of sediment delivery from roads throughout the basin, treatment of disturbed Riparian Reserves and replacement of culverts which are fish impediments.

**Meadows and open oak savannas** are projected to continue to decrease in size due to vegetative encroachment and lack of high intensity fire events, unless encroachment is reduced through manual methods (girdling trees, cutting and removing trees, etc.) and through burning. This habitat type is very important in maintaining the biological diversity within this watershed.

**Bears** have damaged trees on approximately 1300 to 1700 acres of managed stands in the Lower Rogue watershed analysis area in the last three to four years. Some plantations, including the Baxter Progeny Test Site, are experiencing up to 100 percent tree losses due to bears. Without some control over the bear populations and damage, the development of late-successional habitat within this area of Late-Successional Reserve is being moderately to severely inhibited within the watershed analysis area.

Four species that the Endangered Species Act lists as **endangered or threatened** are found within the Lower Rogue Watershed, below Agness. These species are the bald eagle, northern spotted owl, marbled murrelet and the coho salmon.

The watershed has numerous occurrences of **several sensitive plant species**. It is particularly important for Siskiyou Daisy (*Erigeron cervinus*) and Leach's brodeiae (*Triteleia hendersonii* variety *leachiae*), and is the only known Curry County site for Dwarf Downingia (*Downingiayini*).

Large numbers of **exotic and noxious weeds** have invaded the watershed and are increasing in numbers. Poison hemlock, toxic to both humans and livestock is found in Quosatana Campground and along the Agness Road.

**Port-Orford-cedar** is an important component of the vegetation in this watershed, particularly in riparian areas. Port-Orford-cedar root disease (*Phytophthora lateralis*) has killed some of the trees in nearly every subwatershed within the analysis area, and continues its slow rate of spread.

**Fire** has helped to shape the vegetative characteristics within the watershed, as well as any associated effects to dependent wildlife species, within the watershed. Studies indicate that natural fire occurrence was likely to have been of moderate return intervals, of primarily low to moderate severity, with random events of high severity burning. It is generally accepted that Native Americans used fire as a tool of sustenance for the benefit of their group(s). The advent of European settlement likely increased the frequency, size, and severity of fires in the watershed, probably to rates beyond the range of natural conditions. Beginning in the 1940s fire suppression began to reverse this trend, with policies to stop all fires at the smallest possible size. The absence of fire as a natural disturbance agent is leading to conditions more prone to higher severity fire, while creating less diversity across the terrestrial landscape. Current management policies will allow fire to play a more natural role, once studies are completed and plans have been drafted.

The lower Rogue River watershed has provided habitat for human migration and livelihood for thousands of years, and contains both prehistoric and historic sites which represent every **cultural** era in local history.

The Rogue River watershed from Agness to the mouth is a diverse watershed for **recreational use** on the Gold Beach Ranger District. This section of Rogue River corridor receives the highest number of visitors of all watersheds on the District.

Most of the **roads** in the National Forest portion of the watershed were constructed in the decade beginning in the early 1960s. The culverts on these older roads have exceeded their life expectancy and may fail, blocking roaded access as well as contributing to resource damage. The Agness Road parallels the Rogue River, crossing geologic faults and slump-earthflow features that cause chronic road failures and drainage problems.

# AQUATIC ECOSYSTEM NARRATIVE

## Geology

### Lower Rogue River

The Rogue River, from headwaters to mouth, crosses three geologic provinces and millions of years in geologic time. Its origin is in the volcanic highlands of the Cascades Province, relatively young volcanic rocks of 38 to 9 million years for the Western Cascades, with historically recent episodes of volcanism recorded in the High Cascades. The Rogue River and its major tributary the Illinois River traverse the Klamath Geologic Province, an accretion of ancient (approximately 200 million to 65 million years old) metamorphosed volcanic and sedimentary rocks that extend from northern California through southwestern Oregon. The river skirts rocks of the Coast Range (approximately 60 million years old) near Agness, but turns again to run through rocks of the Klamath Province until it reaches Gold Beach.

The Rogue River basin between Agness and the mouth of the river lies entirely within rocks of the Klamath Geologic Province, all of which have undergone some degree of tectonic deformation, alteration, and episodes of granitic intrusions. The Klamath Province extends from northern California through southwestern Oregon and consists of late Jurassic to early Cretaceous-aged arcuate belts of rocks that bend convexly to the west and trend roughly north. The oldest rocks are in the eastern portion of the river basin, with progressively younger rocks to the west. The rock formations were formed in a marine environment as part of a continental margin or volcanic island archipelago, which collided with and was accreted to the continent by the process of subduction (Orr, 1992). Portions of oceanic floor, including what are interpreted as upper mantle material (ophiolite suite) were also accreted to the continent (Mason, 1977). Heat generated during these tectonic processes melted portions of both oceanic and continental material, which were subsequently intruded into faulted and fractured zones as igneous sills and dikes.

The Rogue River is an antecedent stream. It possessed enough erosive power to cut a relatively direct western course through bedrock as tectonic processes were uplifting the Klamath Geologic Province and hindering passage between the Cascades and the ocean. During this time, the rock formations experienced intensive folding and faulting that are part of the accretionary process in an active subduction zone. East-dipping faults thrust older rocks over the younger rocks. These rocks were subsequently offset by north-south trending normal faults and shear zones, followed by northwest trending high angle faults. In the analysis area, this structural displacement is especially evident between the confluence of the Illinois River and the mouth of Bradford Creek. The Mountain Wells and Coquille River Faults are both extensive major faults in the area. North-south trending faults are reflected in the geology and topography of the analysis area (see Map 6, Slope Classes and Map 7, Geology).

Although even major faults appear as narrow lines on regional geologic maps, in actuality a fault trace is most often a zone of sheared and altered rock up to one mile wide. Serpentine and landslides are commonly associated with the fault zones, making geologic mapping even more complex and difficult. Proximity to fault zones increases the amount of groundwater (perched water tables, springs), and reduces the strength of already weakened, sheared bedrock by increasing the degree of alteration and weathering in the underlying rocks. Mass wasting, soil creep and stream bank instability are common within shear zones in the watershed area. The faults also strongly influence stream course and gradient, especially where rock types of different hardness are juxtaposed. Sharp and unlikely stream bends and meanders can often be traced to fault offset.

The terrain through which the river travels between Agness and the Pacific Ocean reflects the underlying rock types and tectonic history. More easily eroded rocks in the area such as mudstone and serpentine erode into rounded hills, while harder, more resistant rocks such as metamorphosed volcanic rocks form sharp ridges, knobs, and peaks that overlook the river valley.

## Lithology, Soils and Slope Stability

Formations of the Western Jurassic Belt are exposed in the watershed analysis area and provide a representative slice of the complex terrane that is the Klamath Geologic Province. The following section outlines a brief description of the rock types, typical soils that are derived from the different rock types, and a general slope stability description. Geologic maps for the analysis area were compiled by using DOGAMI geologic maps, mapping done during previous studies done in the area, and aerial photo interpretation. Some, but not all of maps are entered into the Geographic Information System (GIS) database. They are not included in the Watershed Analysis document but can be viewed in District geology files. Slope stability mapping was done using a combination of contracted map analysis and aerial photos from flights in 1997 and 1986 with spot-checking of photos from 1969. The map included in the document was compiled by US Geologic Survey in 1991 and is part of the Forest GIS database.

**Quaternary unconsolidated alluvium, colluvium and fluvial deposits (Qus):** Geologically recent alluvial, terrace and landslide deposits consist of unconsolidated sand, silt and gravels deposited by water or erosional processes. Mineralogy is dependent on the source material. There are substantial terrace and streambed deposits along the flood plain of the Rogue River and some tributary streams where lower gradients have allowed deposition of material. These reaches of lower gradient can often be traced to lithologic (rock type) or structural influence (faults or folds), or to accumulations of landslide debris.

Humans have long used the terraces in the watershed area for settlements, pasture, and agriculture. Soil development tends to be minimal and droughty on these deposits. Deeper, productive soils have developed on several of the higher and more ancient terraces, possibly accelerated by organic material from crops and livestock. However, because of position on the lower slope and poor consolidation, alluvial deposits are prone to stability problems caused by undercutting from streams, roads or building sites. Surface erosion and landslides can also be triggered by groundwater saturation or by concentrating surface water runoff.

The larger landslide deposits in the area are generally within less resistant rock type with finer-grained soils. The deposits are often hummocky or benchy landforms with deep, clay-rich soils. Large slump/earthflow forms and deposits were mapped in the drainages of Bill Moore, Sundown, Stonehouse and Painted Rock Creeks.

**Cretaceous marine sedimentary rocks (KJm):** There are two formations in the Cretaceous Myrtle Group exposed in the analysis area; the Humbug and Rocky Point Formations. The Humbug group consists of coarse conglomerates and sandstones with some mud and siltstone, while the Rocky Point Formation contains more fine-grained sand, silt and mudstone. The majority of the Humbug and Rocky Point exposures occur north of the analysis area. Within the watershed, they are associated with major faulted areas, so they are highly sheared and difficult to differentiate.

Soils developed on the Humbug Formation are coarse-grained, have shallow to moderate depth, and are free draining to the point of being somewhat droughty. Surface ravel and shallow debris slides are the most common forms of erosion. Rocky Point soils are generally deeper and more fine-grained. They tend to be more poorly drained, are also subject to ravel and prone to debris slides especially in areas of increased groundwater. Inner gorges within the Rocky Point are often very unstable.

**Jurassic Dothan and Otter Point Formations (Jop, KJds, KJdv):** Metamorphosed sedimentary and volcanic rocks of late Jurassic age cover large areas of Curry County and the analysis area west from near Kimball Hill. In the eastern part of the County, the rocks are mapped as the Dothan Formation, thin to thickly bedded marine sedimentary rocks (KJds) with minor amounts of deep water chert and volcanic pillow basalts and breccias (KJdv). The Otter Point Formation (Jop) mapped in the western part of the analysis area is similar in composition and age to the Dothan, but contains more finer-grained, thinly bedded meta-sedimentary units, more volcanic inclusions and is more pervasively sheared. It is mapped as a 'mélange', the French word for mixture. A mélange is defined as a complex association of varied rock types of diverse origin, highly sheared, with intermixed serpentine and blue schist, and commonly associated with subduction or overthrust zones (Raymond, 1984). It can be difficult to differentiate between the Dothan and Otter Point formations in the field unless shearing or lithologies are exposed over large sections. Rocks of the Otter Point Formation, including sheared serpentinite zones, are well exposed at the mouth of the Rogue River in Wedderburn.

Terrain within the Dothan Formation varies according to underlying rock type: fine-grained siltstones and mudstones form rolling hills with low relief; coarser-grained sandstone and greywacke form steeper, rocky ridges; volcanic units or inclusions form knobs and cliffs or rock outcrops. Sheared mudstones, siltstones and serpentine also form rolling hills and prairies in terrain underlain by Otter Point Formation. In both formations, soils derived from coarser-grained rock types, such as sandstone or conglomerate, are of a more medium depth, sandy and well drained. Soils derived from fine-grained rocks tend to be deep, silty or clayey in texture, and are poorly drained. Volcanic units form shallow, rocky soils.

Slope instability is most pronounced in the highly sheared, fine-grained metasedimentary units of the Otter Point Formation, especially where slopes are saturated and/or undercut by streams, as in inner stream gorges, or in areas affected by roads, construction, or ocean waves. In coarser-grained units, road building activity and logging appear to increase the number of small landslides, ravel and surface erosion on steep slopes, and debris flows associated with road failures. Faulted and sheared zones, which are areas of groundwater concentration, deeper soils, and fractured, weakened bedrock, are often areas of decreased slope stability.

**Jurassic Colebrooke Schist (Jc):** The Late Jurassic Colebrooke Formation includes metamorphic rocks derived primarily from fine-grained marine sedimentary rocks and submarine basalts, with some metasandstones and chert. Probable sources were the older Galice or Rogue Formations, located east of the analysis area. The predominant rock type in the Colebrooke is a tightly folded, silver-gray, fine-grained schist or phyllite. White chert seams and fracture filling are common. Weathered clasts of phyllite appear as flat, shiny coins in the creek beds and gravel bars.

Colebrooke terrain is typically rolling and benchy, interspersed with knobs and rocky outcrops where volcanic units are exposed. Large chert 'knockers' often form resistant knobs within bowls of more easily eroded schist or phyllite. Streams are typically deeply incised within inner gorges. Soils developed on steep ridges and oversteepened stream banks are shallow and fine-grained with abundant quartz clasts. More typically, the Colebrooke forms deep, dark gray residual and colluvial soils, also with abundant quartz clasts. On stable benches, weathering has developed red, iron-rich lateritic soils. Drainage characteristics of the soils range from well- to poorly-drained, often depending on slope configuration.

Within the analysis area, the most extensive form of erosional processes occurs in terrain underlain by Colebrooke Schist. The relatively rapid tectonic uplift rate of four to five millimeters per year measured on the coast of southwestern Oregon contributes to continuous down cutting by streams. This tectonic uplift and stream down cutting, plus pervasively sheared, faulted, and deeply weathered bedrock have combined to produce large areas of instability. The activity on many of these may date back to glacial periods. The fine-grained, cohesive soils derived from schist and phyllites commonly fail as deep-seated slump-earthflows. The earthflow features often encompass entire watersheds, although activity levels on individual lobes and benches can vary from ancient inactive, to recent and very active. Most commonly, however, the failure exhibits a steady creeping and slumping of material down slope. Incised margins and the toes of the landslide deposits often fail as shallow debris slides. Two very large, recent debris failures associated with basin-wide slump/earthflows occurred in Bridge and Bill Moore Creeks (the Moorsky slide) as recently as the winter of 1996-97.

**Ultramafic rocks (Ju):** In the analysis area, serpentinites occur along faults and zones of shearing that occur in conjunction with major faulting or within ophiolitic mélanges such as the Otter Point Formation and the near-by Josephine ophiolite sheet. Landforms underlain by serpentine are often gentle and rolling. Where oversteepened by road cuts or stream cutting they can fail as debris slides, and oversteepened stream banks are often unstable. Streambeds can become wide and aggraded, both from the ease with which streams erode the side slopes, and from the large amounts of landslide debris generated by the bank instability. Because the soils developed on ultramafic rocks are relatively unproductive and poorly vegetated, landslides often continue to fail and ravel, becoming chronic sources of sediment. In areas of deeper soil development, often created along fault traces, deeper-seated slump/earthflows can occur.

Soils developed on ultramafic rock are generally less productive than other soils in the area. They have reduced levels of calcium and elevated levels of magnesium, nickel and chromium that are toxic to most vegetation. Vegetation is often sparse and stunted. Many of the prairies in the analysis area are underlain by serpentinite bedrock. Where parent material is mixed, or fault or shear zones have accelerated weathering and concentrated groundwater, deeper, more productive soils can develop. Soils are prone to surface erosion as sheet wash and gully formation, or ravel on rocky, steep slopes. Long-term compaction can occur with use of heavy equipment.

## Geologic Structure

There are three major mapped faults in the analysis area. Although the faults appear on geologic maps as well defined lineations, in actuality they represent wide shear zones that may contain slices of different rock types, other associated faults, and areas of fractured and contorted bedrock. Some of the earliest tectonic activity is represented by a thrust fault that emplaced older Colebrooke schist over rocks of the younger Otter Point formation west of the mouth of Lobster Creek. The Mountain Wells and Coquille River Faults are younger, high-angle, north-trending faults. Bradford Creek follows a trace of the Mountain Wells Fault, and the Coquille River Fault has been mapped near Copper Canyon. Sheared serpentine has been emplaced in most of the major fault zones. Although most have not been mapped, numerous other faults can be traced in the area, either by changes in rock type or distinct lineations that can be seen on aerial photos.

The significance of faulting can be seen in the geomorphologic expression of the area. Streams such as Bradford, Morris Rogers and Slide Creeks follow traces of high-angle faults; the course of Tom East Creek is influenced by a thrust fault between Dothan and Colebrooke rock types. Fault activity, and the weakening of the bedrock plus concentration of groundwater that occurs in fault zones, have contributed to increased landslide activity in these drainages. The mainstem Rogue River changes direction and has sharp meanders where faults and shear zones juxtapose rock types of different hardness, for example at Copper Canyon and near the mouth of Wakeup Rilea Creek. The hard, prominent ridge that has created the rocky gorge of Copper Canyon is a fault-bounded block of metamorphosed volcanic rock within the Colebrooke Formation that has weathered to the reddish-brown, coppery color that gives the canyon its name.

Within faulted zones, rocks are more sheared and fractured and more deeply weathered. Ground water tends to be more concentrated in these areas, and soils are deeper. Streams are often more deeply incised into the weaker, sheared rock. Slope instability is a natural outcome of the above conditions, and it is not surprising that landslides are a common and natural occurrence within the analysis area.

***Management Opportunities***: Complete transfer of DOGAMI Geology maps into GIS geology layer.

## Subwatershed Descriptions

See also channel morphology descriptions on pages 25-29.

**Tom Fry Creek:** The headwaters of Tom Fry Creek are in Cretaceous sedimentary rocks. A fault zone cuts the drainage; the lower two-thirds of the drainage is underlain by serpentine. Jones and Ferrero mapped numerous active debris slides and ravel slopes in the headwaters of the west fork that were apparently related to timber harvest and road building activity. The stream adjacent slopes exhibit both stream bank instability and rock outcrops. In the lower watershed, above the 3300250 crossing, the stream has incised steep, raveling bluffs into serpentine.

**Nail Keg Creek:** The headwaters of Nail Keg Creek are pervasively faulted and sheared, containing slivers of serpentine, Cretaceous sedimentary rocks, and a high grade, slaty metasedimentary rock that may be gradational between Jurassic Galice and Colebrooke schists (Ferrero, 1991). Large slide scarps and cracks, hummocks and benches characterize this area, as well as sag ponds and wet areas, steep inner gorges and numerous leaning trees. Both small debris slides and larger slump/earthflows were mapped in the area (Jones and Ferrero, 1990).

***Management Opportunities:*** Road systems in the headwaters of this drainage should be evaluated for stability concerns and possible decommissioning or storm proofing.

**Wakeup Rilea Creek:** Wakeup Rilea drainage is underlain by Colebrooke schist, and bounded on the southeast by Wildhorse Ridge, which is made up of a harder, and more resistant volcanic unit within the Colebrooke. Much of the drainage can be characterized as a slump/earthflow terrain with a series of scarps, benches, and sag ponds. Several earthflow lobes appeared active on aerial photo investigation. Debris slides and raveling slopes are common where the larger slump/earthflow deposits toe out and offset the stream channel. The stream appears aggraded on aerial photo review.

***Management Opportunities:*** Conduct more intensive mapping, activity rating and hazard analysis of the landslides in this drainage, and review roads in the upper drainage for stability concerns and possible decommissioning or storm proofing.

**Bradford Creek:** Bradford Creek follows the trace of the Mountain Wells Fault zone, which divides the drainage between Colebrooke Schist on the east and west, with rocks of the Dothan Formation in the center. Volcanic units within the Colebrooke underlie the rocky, resistant ridges that define the watershed divides. Debris slides are common off steep slopes in the headwalls. Older failures may be related to bedrock fractured and weathered from faulting, or a possible stand-replacing wildfire. Recent landslides in the upper drainage, however, appear to be related to harvest activity, especially where roads have undercut unstable slopes. Streams appear aggraded on air photo review. See Bradford Creek Watershed Analysis for more detail.

***Management Opportunities***: Evaluate roads in the upper drainage for stability concerns and possible decommissioning or storm proofing.

**Jim Hunt Creek:** The headwaters of Jim Hunt Creek are underlain by Colebrooke schist that has been thrust over younger rocks of the Otter Point mélange. Within the mélange terrane, volcanic units form ridges and buttes, with more gentle slopes underlain by fine-grained, pervasively sheared metasedimentary rocks and serpentine. Debris slides are common within the creek's steep, inner gorge. Both the metasedimentary rocks and serpentine produce fine-grained soils that are prone to gully erosion.

**Kimball Creek:** Similar to the geologic structure of Jim Hunt Creek, the lower portion of Kimball Creek watershed is underlain by Otter Point metasedimentary rocks, in fault contact with Colebrooke schist found in part of the headwaters. The trace of the thrust fault is a zone of sheared and fractured rock within the already pervasively sheared and convoluted rock that characterizes the Otter Point mélange. Erosional processes include deep-seated slumps or slump/earthflows, and shallow debris slides. Rounded ridge tops are often underlain by capstones of more resistant conglomerates. Many of the meadows in the area are a result of the shallow, droughty soils derived from this rock type. The ridges are scalloped by steep, arcuate headwalls of ancient slides, with some more recent debris slides within the headwalls. In many areas, mudstone underlies the conglomerates. Flat benches of slump deposits have deep, poorly consolidated soils that exhibit deep gully formation. Wet, swampy areas and small sag ponds are present on some benches. Numerous debris slides can be mapped below benches where streams have undercut slopes. Inner gorges are deeply incised and unstable.

***Management Opportunities:*** Although many of the landslide headwalls within the drainage are ancient and inactive, an area in Section 7 near Kimball Hill shows active instability and should be designated as unsuitable for timber management (TML). It may have potential as an interpretive site to demonstrate geologic and mass-wasting interactions.

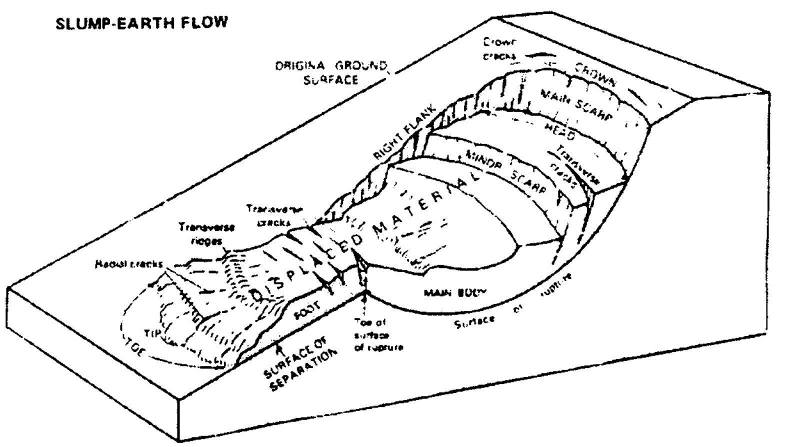
**Bill Moore Creek:** The entire Bill Moore Creek drainage basin was mapped in 1984 as a large slump/earthflow complex containing ancient to recent landslide features (Schlicker, 1984). Mica schist, phyllite, fractured quartz inclusions and pods of in-faulted serpentine underlie the area. Bedrock is highly sheared, deformed, and deeply weathered into moderate to deep clay-rich soils. Schlicker divided the basin into distinct areas: upper and side areas of steep slopes (head and lateral scarps of ancient slides), middle areas of flatter slopes (slump benches), and lower areas of steep slopes and active landslides (secondary scarps and/or terminal slide deposits). The lateral margins of the ancient slide are composed of more resistant rock within the Colebrooke. They affect the movement of the earthflow complex by acting as buttresses on the lower slide masses, and by protecting the toe of the deposit from erosion and undercutting by the Rogue River. Bill Moore Creek and its tributaries are actively downcutting through the weathered bedrock and slide deposits, creating steep, unstable inner gorges.

Monitoring using survey stake transects was implemented from 1984 through 1990 to help determine effects of harvest activities on large, deep-seated earthflows. Transects were located below a proposed harvest unit and road on an area ranked ancient, inactive. Average movement noted after five to six years of monitoring suggested a very slow, but steady movement of soil down slope. Within such a large earthflow complex, however, it is difficult to predict exactly where the next catastrophic failure will occur, and it is financially infeasible to cover an entire 800-acre landslide basin with monitoring equipment. An approximately 12-acre failure occurred in the winter of 1996-97 immediately adjacent to a 19-acre harvest unit that had been clear-cut in 1988, but not within the area being monitored. Since the harvest unit is located on the opposite side of a ridge from the landslide scarp, it is not likely that harvest activity influenced the timing or initiation of the recent failure, but rather that the landslide was triggered by the storm event that occurred that winter. Debris from the recent failure was deposited on an area mapped in 1984 as a landslide debris deposit, suggesting a mode of recurrent and periodic failures that are common in this earthflow complex.

***Management Opportunities:*** Numerous geologic reviews and reports have been completed in the Bill Moore watershed. The basin can be characterized as a large slump/earthflow complex bounded and buffered by more resistant bedrock ridges to the east, south and west. The feature is composed of multiple scarps, basins, and lobes of deposits of landslide activity levels ranging from ancient inactive to recently active. The earthflow features move into and merge in the center of the basin, much like glacial morphology. Risk analysis and hazard zonation mapping have been done on the basin in the past to determine areas suitable for timber harvest. Although parts of the basin are currently designated as suitable for management activities (matrix), it may be reasonable to reclassify the entire earthflow complex as unsuitable for timber management (TML) in the next Forest planning effort. Roads within the basin should be evaluated for decommissioning or storm proofing based on past history and resource concerns.

**Painted Rock, Sundown and Stonehouse Creeks:** The area north of Copper Canyon on the Rogue River is a classic example of how rock type, geomorphic processes and tectonic activity combine to produce conditions of slope instability. Ferrero (1992) mapped large slump/earthflow complexes that define the three watersheds, all with typical cross-sections showing the characteristic scarp, slump bench, and debris deposit morphology. Pervasively sheared, fine-grained schist and phyllite with fractured quartz filling or interbeds underlie the watersheds. The material is deeply weathered, highly faulted, and structurally weak. The area is a shear zone created by a series of older thrust faults, more recently cut by the Coquille River Fault and several other north-trending high angle faults. Slopes have moderate to deep, poorly drained soils. Shallow groundwater tables are expressed as numerous wet benches, sag ponds, and seeps. Lake of the Woods is a sag pond located in the headwall of the large Painted Rock slump/earthflow complex.

**Figure 1. Slump Earth Flow Diagram**




Modified from Varnes, 1978.

There is a wide range of landslide activity levels within the complexes, from ancient, inactive benches to recent movement. Recent activity can be rapid to slow creep, or steady slumping and creeping of earthflow lobes. Cracks in the ground, hummocky terrain, and leaning or tipped trees are indications of recent activity. Stream undercutting (either because of erosion of deeply weathered and weak materials, or tectonic uplift, or a combination of both) has created inner gorges and oversteepened deposits that fail as debris slides and ravel. Numerous debris slides and smaller slumps within inner gorges were mapped by Ferrero. Although the debris slides are smaller components of the larger slump/earthflow complexes, larger slides have scoured portions of Stonehouse and Bridge Creeks.

*Management Opportunities:* Slopes north of Copper Canyon are characterized by large slump/earthflow complexes with ranges in landslide activity levels from ancient to very recent. Roads within this area will be long-range maintenance problems. Failures in road crossings will also contribute to resource concerns in the drainages, adding more sediment to systems that already receive large amounts of sediment from natural sources. The comprehensive mapping of the geology and landslides that exists for the area will serve as a valuable tool to identify and prioritize roads for decommissioning and/or storm proofing.

Meadows on these slopes are underlain by serpentine soils or shallow, droughty soils derived from fine-grained metasedimentary rocks. Some of the meadow areas were enlarged through logging activity or pasture use and maintenance. These land use practices make it difficult to determine the extent of a meadow ecosystem from aerial photo interpretation alone. If meadow enhancements are intended to be maintained over long time frames, it is important to verify the soil, geomorphic and vegetative parameters of a meadow ecosystem. The LRMP identifies meadows areas and gives direction for enhancement projects. The soil inventory done for Curry County is a tool that can help determine where specific meadow enhancement techniques would be most effective. Roads are a lasting feature on fragile, meadow soils and should be evaluated for innovative restoration techniques based on topography and soil types.

Figure 2. Stream Profile Tom Fry Creek

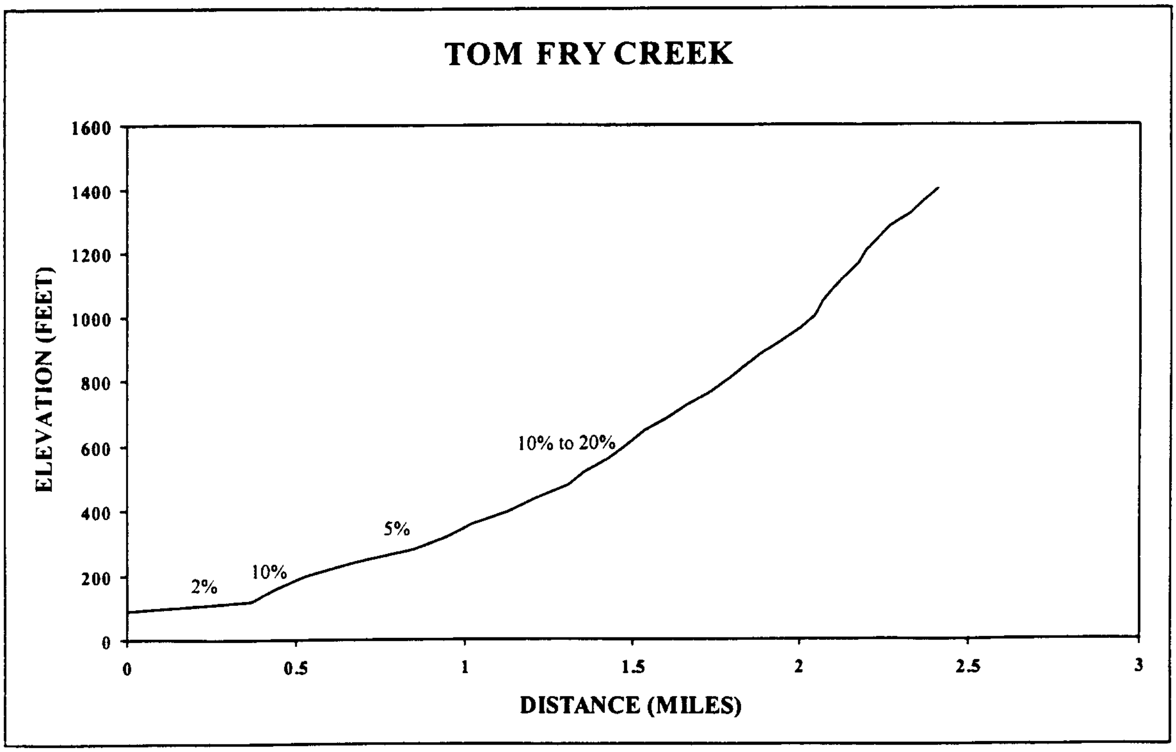



Figure 3. Stream Profile Rilea Creek

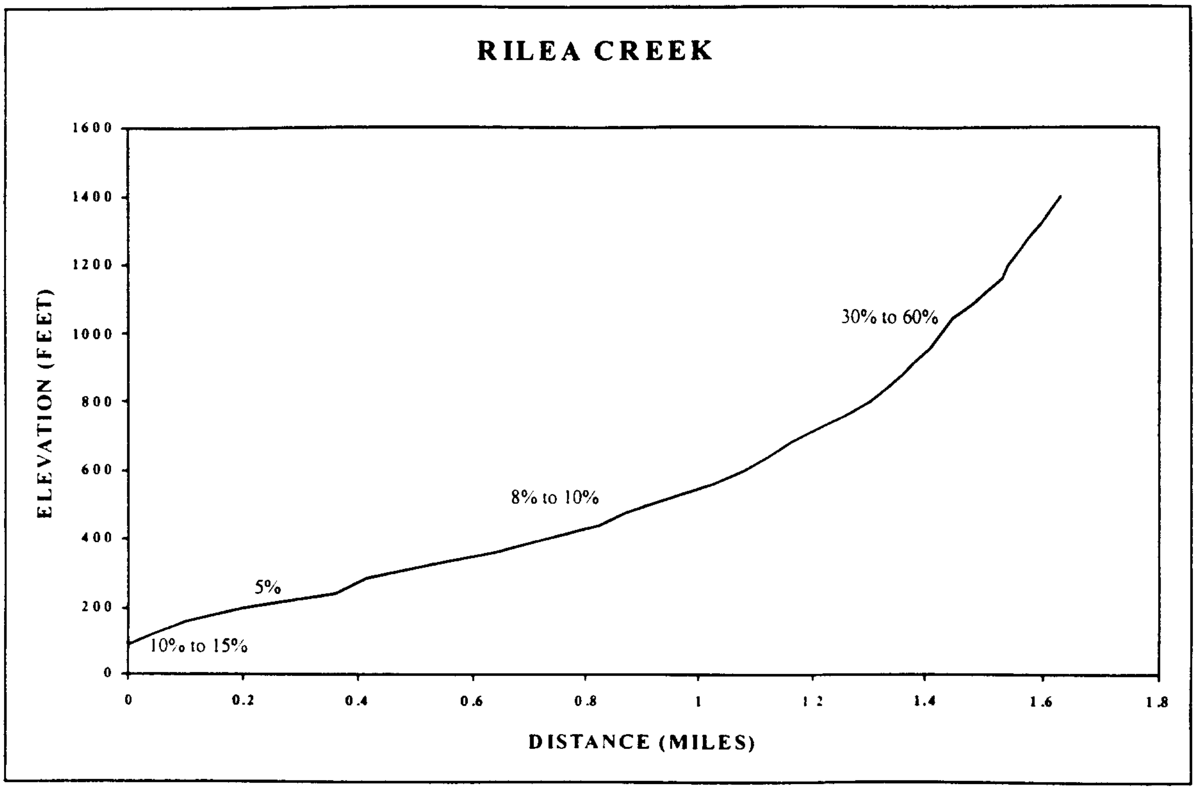


**Figure 4. Stream Profile Nail Keg Creek**

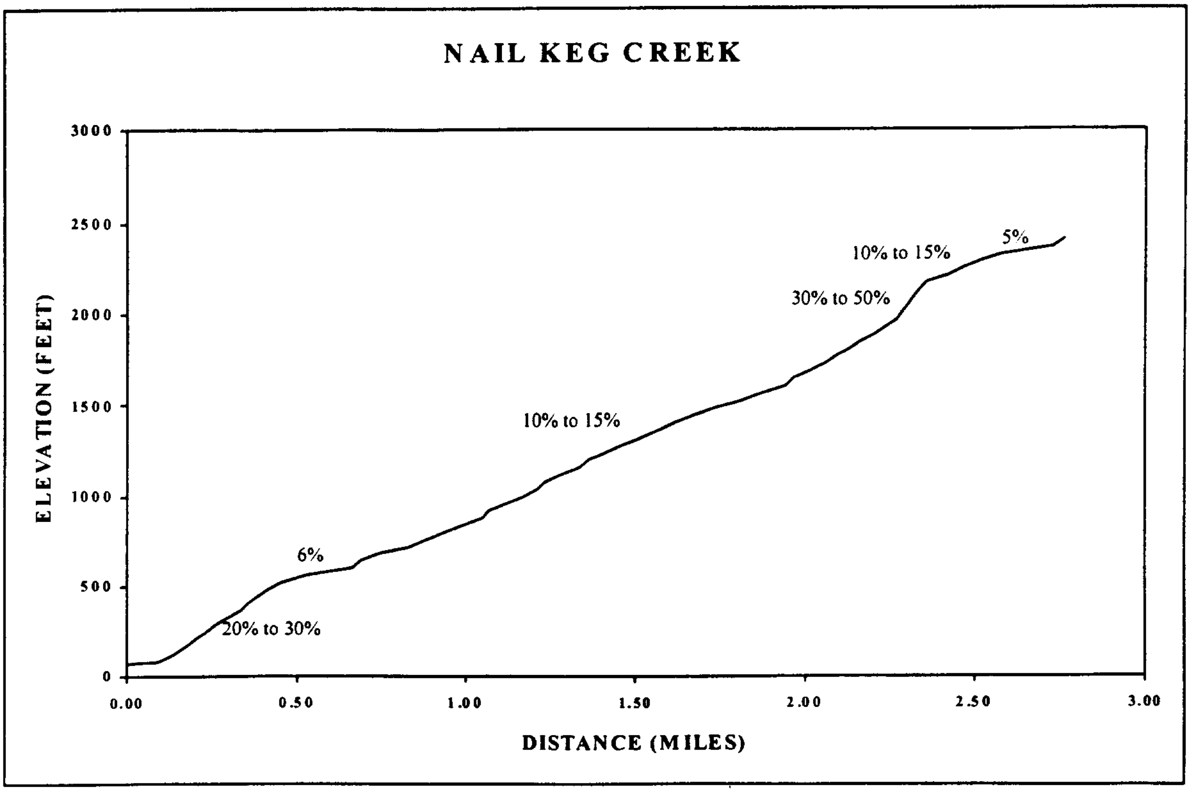



**Figure 5. Stream Profile Painted Rock Creek**

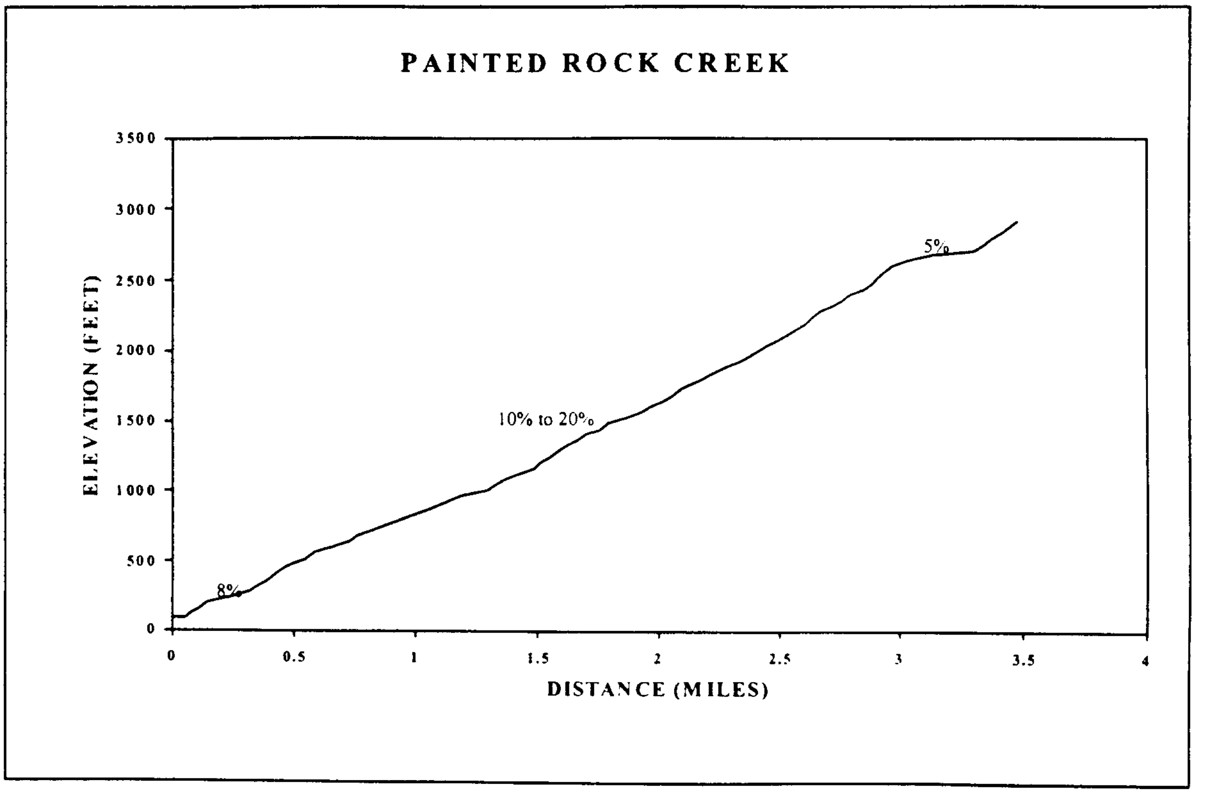


**Figure 6. Stream Profile Wakeup Rilea Creek**

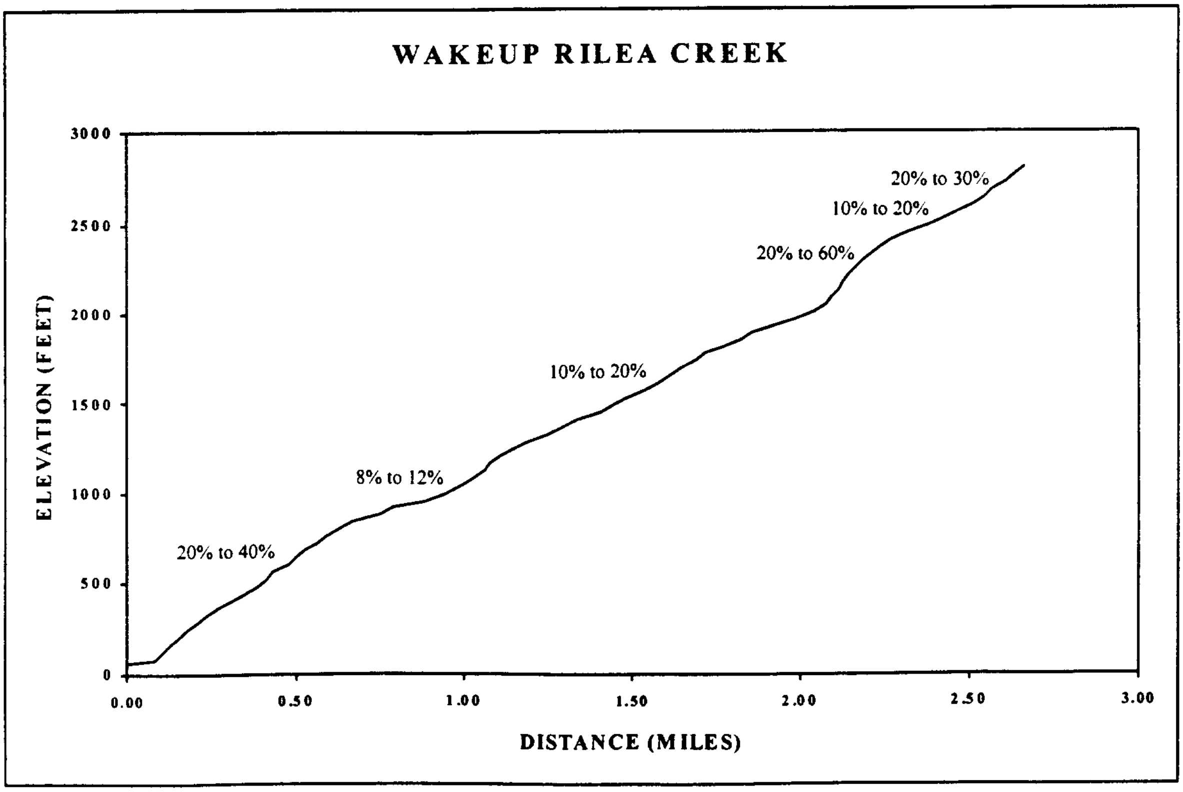



**Figure 7. Stream Profile Silver Creek**

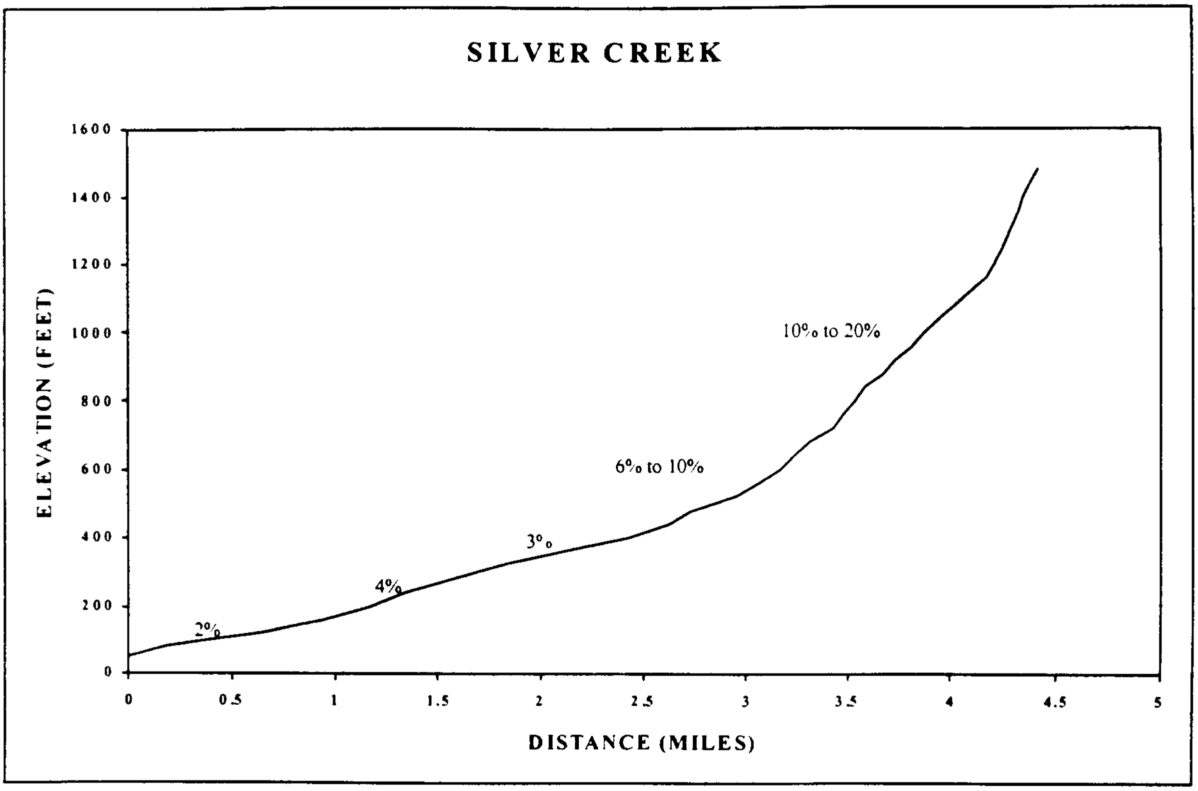


**Figure 8. Stream Profile Kimball Creek**

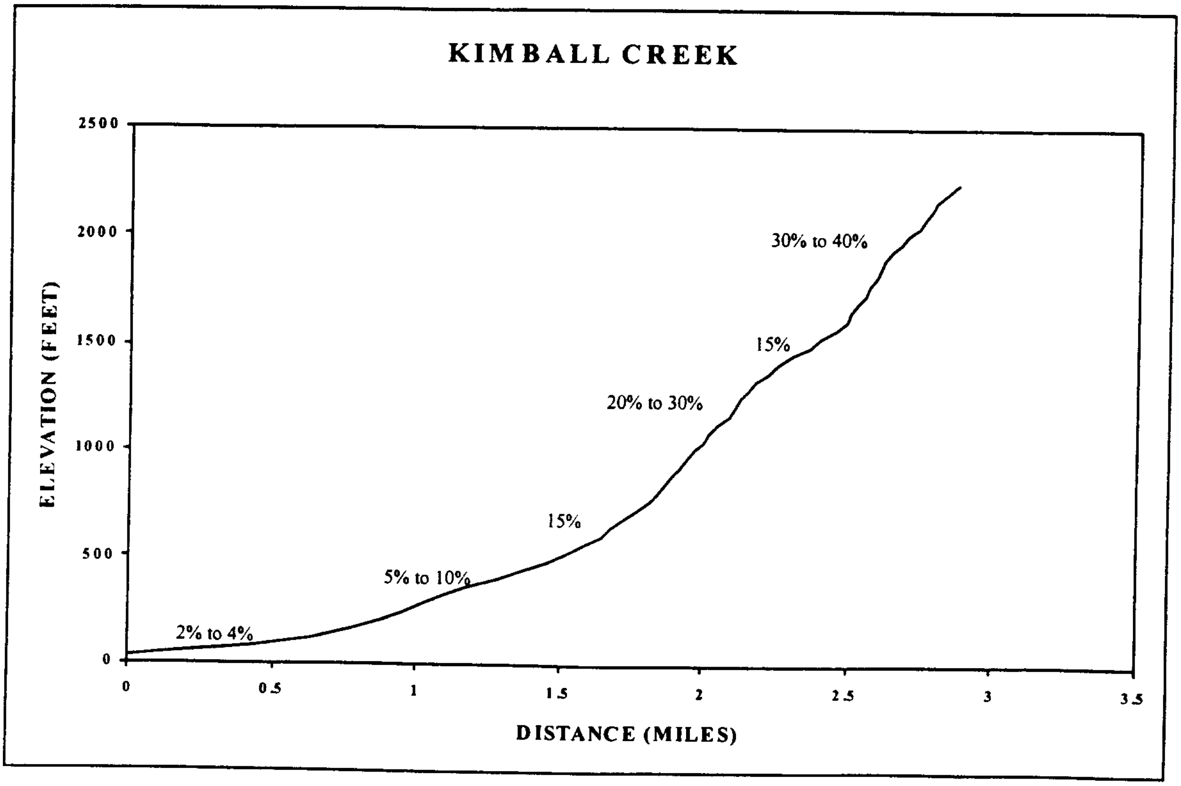
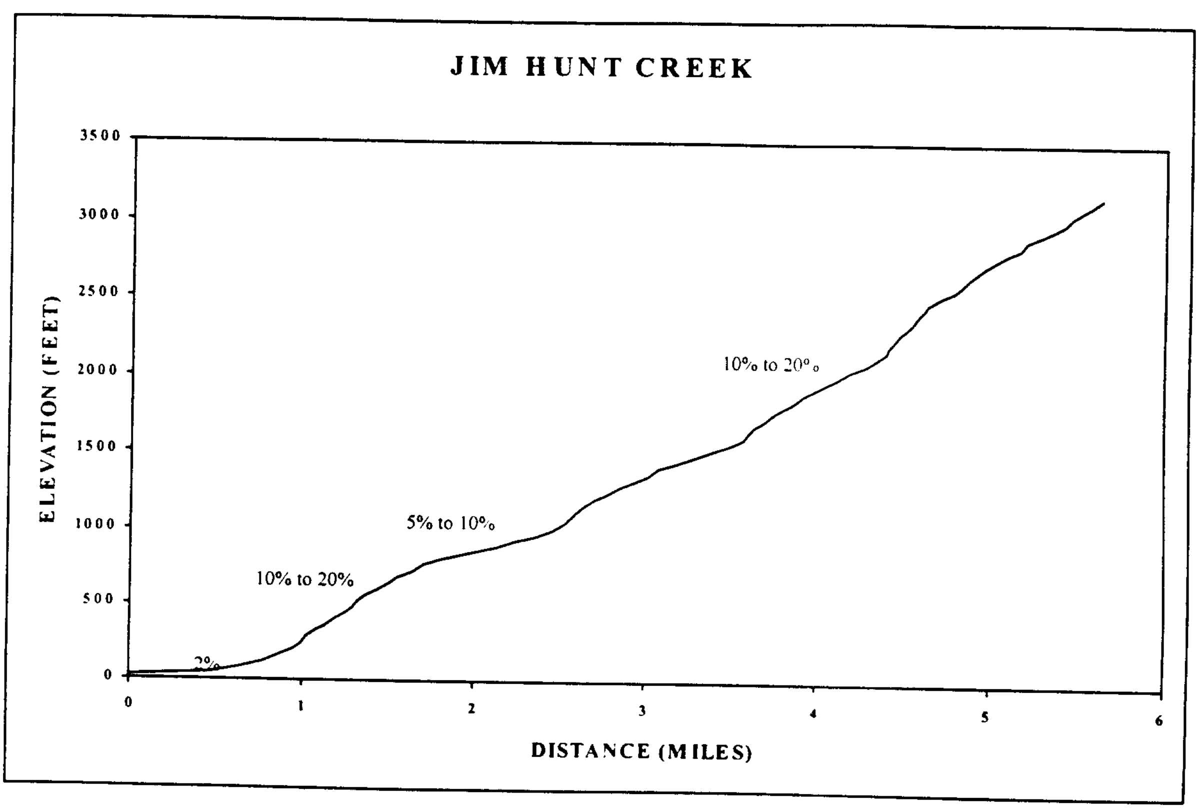



**Figure 9. Stream Profile Jim Hunt Creek**



## Hydrology

### Rogue River Basin

#### *Climate*

The climate of the Rogue River basin varies because of its steep topography and interception of moisture from the Pacific Ocean. Lower temperatures and more precipitation occur on the west slope of the Cascades and in the Siskiyou Mountains. The valleys between these slopes are generally drier with high summer temperatures. Annual precipitation is high on the coast (over 100 inches near Gold Beach) and low in interior valleys (19 inches at Medford). About 80 percent of this precipitation occurs between October 15 and May 15. Snowfall is prevalent at Crater Lake with an average of more than 500 inches per year. Near the coast, cool and humid weather prevails throughout the year. Farther upstream, the effects of the marine climate are less pronounced and the weather is often hot and dry during the summer.

George Taylor, the State of Oregon Climatologist, compiled annual rainfall data for Oregon that has been collected since 1850. By comparing each year's annual precipitation to the average for the period of record, he found a precipitation cycle of 20 to 30 years. These precipitation cycles are reflected in streamflow records and fish population records (Taylor, 1999).

| | |
|---|---|
| 1896-1916 | wet |
| 1916-1946 | dry |
| 1946-1976 | wet |
| 1976-1996 | dry |

#### *River Flow*

The Rogue River had an average annual discharge into the Pacific Ocean of 5,661,000 acre feet prior to the construction of the Applegate and Lost Creek dams (Federal Register, 1972); and 3,974,000 acre feet per year since 1978. The Rogue River Basin has 24 gaging stations currently measuring stream flow. Fifteen of these also record water temperature.

Moderate to heavy runoff throughout the winter and early spring typifies stream flow patterns with low flows during the summer and fall. Many of the small tributary streams become completely dry during the fall.

Stream flow at the mouth of the Rogue River has varied from under 1,000 cubic feet per second (cfs) in the record drought years of 1931 to 1940 (before Lost Creek and Applegate Lake flood control projects) to over 500,000 cfs in the December, 1964 flood event. During the dry summer most of the stream flow is attributable to the high mountain snowpack areas in the Cascade and Siskiyou Mountains.

The largest flood of historical record occurred in 1861 and the second largest in 1890 (Federal Register, 1972). More recent flood events were in 1955 and 1964. Gaging station number 14361500 at Grants Pass began collecting stage and flow data in 1938. Extreme peak flow stages from before 1938 are based on information from local residents.

| Year | Month | Grants Pass Stage height (feet) |
|---|---|---|
| 1861 | December | 43 |
| 1890 | February | 36 |
| 1927 | February | 32 |
| 1955 | December | 30 |
| 1964 | December | 35 |

From the 1920s through the 1950s storage reservoirs were constructed to supplement irrigation withdrawals (Fish Lake, Emigrant Lake, Agate Lake, Howard Prairie, Hyatt Lake). Timber harvest and road building were increased in the upslope, steep headwater areas of the Cascade and Siskiyou mountains after World War II. By 1955 there was considerable settlement in the interior and coastal valleys of western Oregon. Agriculture development channelized many streams and removed instream scour elements like large wood and boulders. Much of the meandering and side channel habitat historically present was eliminated.

Roads were also constructed in association with timber harvest in the lower elevations by 1955. Many roads were located in the lower stream valleys. Logging practices included tractor skidding over compactable soils and in stream channels, low standard roads, and log stream crossings.

Following flood events, the reaction measures were perhaps as catastrophic to fish habitat as the floods themselves. Anecdotal accounts speak of debris removal and machine work in stream channels. Long sections of streamside roads that washed out were replaced with riprap fortification. A strong bias against large wood in streams and stream meandering persisted from this period to today. In the 1970s and 1980s, the Lost Creek Dam and Applegate Dam were constructed with the objectives of flood control, recreation, and increasing summer streams flows for fish and irrigation. All of these activities had cumulative effects on sediment delivery to streams, summer and winter flows, stream temperatures, the range of anadromous salmonids in the basin and other freshwater fish habitat components.

### *Channel Morphology*

The river has three general morphology types. From its headwaters in the Cascades it flows through steep bedrock gorge terrain. As it crosses the central portion of the basin, the Rogue River meanders through a flat valley, known as the Rogue Valley, with agricultural, rural residential, and urban developments including Medford and Grants Pass. Below Grants Pass, the river once more enters a bedrock gorge, with sharp ridges and steep tributary canyons that gradually open to rounded hills near the estuary and ocean.

### *Water Quality*

Bacteria counts in the Rogue River have exceeded State standards for many years. The Oregon Department of Environmental Quality listed the Rogue River as water quality limited under 303(d) in 1996 and 1998. Segments that do not meet the standards are:

**Table 4. Rogue River Water Quality Limited Segments**

| Rogue River Segment | Parameter |
|---|---|
| Little Butte Creek to Grave Creek | fecal coliform |
| Evans Creek to Rogue River Mouth | temperature |
| Applegate River to Rogue River Mouth | pH |
| Illinois River, California border to Rogue River mouth | temperature |

## Rogue River Watershed, below Agness

### *What are the dominant hydrologic characteristics and processes in the Rogue River watershed below Agness?*

#### *Natural Processes*

From the State Precipitation Isohyetal map, average annual precipitation varies from 80 inches along the Rogue River to 130 inches near Signal Buttes. This falls primarily during the winter months, and primarily as rain, with 89 percent of the watershed in the rain-dominated zone, and 11 percent in the transient snow zone (see Map 8, Elevation Zones). Winter storm intensities can range from 8 to 11 inches in 24 hours during a 25-year event to 9 to 13 inches in 24 hours during a 100-year event. Lower storm intensities lie along the Rogue River, with higher intensities along the ridges bordering the watershed.

#### Rogue River

There are no gaging stations within the watershed analysis area, but there have been gages on both the Rogue and the Illinois just above their confluence. Gage No. 14372300, Rogue River near Agness, records streamflow and temperature, which are transmitted to the USGS office in Portland, and available over the Internet. The period of record began in October 1960. The maximum flow recorded by the gage was an estimated 290,000 cfs on December 23, 1964. The minimum recorded flow was 608 cfs July 9 and 10, 1968. The flood event of January 2, 1997 was 250,000 cfs.

The 1964 calculated flow of 290,000 cfs would be slightly less flow than a 25-year event, according to the USGS Statistical Summaries of Streamflow Data in Oregon. The calculations used to estimate this flow may have overestimated the effects of ponding on the river stage, and the actual Rogue River flow may have been much larger.

A gaging station near the mouth of the Illinois River was maintained from October 1960 to September 1981. During the period of record the river had an average annual discharge into the Rogue River of 2,966,000 acre-feet per year, nearly half the discharge of the Rogue River prior to the construction of the Applegate and Lost Creek dams (Moffatt, Wellman, and Gordon, 1990). The maximum flow estimate was 225,000 cfs in December 1964; the minimum recorded was 125 cfs in September 1975.

Since the Rogue at Agness gage was installed in 1960, five peak flows have exceeded the 181,700 cfs calculated by USGS to approximate a recurrence interval of five years. The first four of these, 1964, 1966, 1971, and 1974, were during a decade corresponding to the end of a wet cycle (see Climate under Basin Characterization, above). The fifth, 1997, was near the beginning of the following wet cycle. No flows exceeding the five-year recurrence were recorded during the intervening dry cycle. These data indicate that peak flows, as well as annual water yield, may reflect the cyclical weather patterns.

#### Tributaries to the Rogue River

Tributaries of the Rogue River experience more frequent flood flows than the Rogue River, as they respond to smaller scale, local winter rainfall and rain-on-snow events. An example of the interactions at the mouths of these streams was during the flood events of water year 1997. The November 1996 storm was a coastal rainfall event that caused streams with headwaters near the first orographic divide east of the ocean to rise rapidly from their characteristic low autumn flows to overflowing their banks within 24 hours. The South Fork Coquille River, with headwaters adjacent to the northern boundary of this watershed, recorded a 75-year flood at the gaging station near Powers. The Rogue River below Agness did not exceed its banks during this event. Tributaries were observed shooting flow out into the river as if from a high-pressure hose.

The "New Year's flood" January 1 and 2, 1997 was a rain-on-snow event in the Cascades and higher elevations east of the Rogue Valley. The gaging station on the Rogue River near Agness recorded approximately a 12-year flood event. Tributaries to the Rogue in this section did not exceed their banks, and backwater from the Rogue River extended upstream in tributary channels.

### *Human Influences on Streamflow*

#### Rogue River, below Agness

Flow on the Rogue River has been regulated since February 1977 by Lost Creek Lake and since December 1980 by Applegate Lake, with numerous diversions for irrigation and urban and domestic use. On the Illinois River and its tributaries water withdrawal permits for irrigation, domestic, and municipal use, total 217 cfs.

On the Rogue River below Agness, permits for individual uses are minimal, totaling 0.71 cfs. For municipal use, the City of Gold Beach has two withdrawal permits totaling 10.0 cfs from the Rogue River near river mile 5.0, 1.45 cfs from a well near the same location, and 0.77 cfs from Indian Creek. The Nesika-Ophir water district has withdrawal permits for 0.7 cfs from wells near river mile 5.

The Oregon Department of Fish and Wildlife has an instream water right on the Rogue River for 2,000 cfs for fish, dating from May 7, 1962.

Land use and developments also have the potential to affect the timing and magnitude of flows. Land clearing for agricultural and residential use, timber harvest, road construction, and urban pavement may concentrate flows. In a river system as large and complex as the Rogue, it is difficult to determine how much effect these activities may have had.

#### Tributaries to the Rogue River, below Agness

Water withdrawal permits for domestic, irrigation, livestock, and recreation uses have been issued for streams and springs tributary to the Rogue River. The extent to which these permitted withdrawals are utilized is unknown.

**Table 5. Water Withdrawal Permits.**

| Stream | Cubic feet per second (cfs) |
|---|---|
| Rilea Creek | 0.12 |
| Tom Fry Creek | 0.01 |
| Blue Jay Creek | 0.07 |
| Taylor Creek | 0.29 |
| Smith Creek | 0.40 |
| Tom East Creek | 0.10 |
| Aubrey Creek | 0.10 |
| Silver Creek | 0.01 |
| Unnamed streams | 0.07 |
| Springs | 0.08 |
| Squaw Creek | 0.30 |
| Edson Creek | 0.05 |
| Saunders Creek | 0.02 |
| Indian Creek | 0.12 |
| Unnamed streams | 0.90 |
| Springs | 0.15 |
| **Total** | 3.43 |

The other primary human influences on hydrologic processes are effects of roads and vegetation removal on peak flows. The following factors are indicators of areas where effects may have occurred (USFS, 1993) (see Map 9, Subwatersheds and Streams and Map 21, Regeneration Harvest and Roads).

- More than 15 percent of a watershed analysis area (WAA) harvested in a 30-year period may have increased water yield and minor peak flows; more than 30 percent harvested is likely to have increased flow. Predominant hydrologic recovery is probable after 30 years.
- More than 20 percent of the transient snow zone harvested is likely to increase peak flows during rain on snow events. Hydrologic recovery is dependent on tree height in relation to surrounding forest, and is probable after 50 years.
- Road density less than 3.0 miles per square mile is considered low risk for channel network expansion sufficient to increase peak flows; 3.0 to 5.0 miles per square mile is considered moderate risk; over 5.0 miles per square mile is considered high risk for contribution to increased peak flows.

Several tributary watersheds have levels of harvest or road density that would fall within these parameters (see Table 6, Timber Harvest and Roads by Watershed Analysis Areas). The watershed analysis area (WAA) within the National Forest that is most likely to have flow alterations as a result of management activities is 21L05W, Wakeup Rilea Creek. In addition to the 37 percent harvested in the past 30 years, 53 percent of the transient snow zone has been harvested, and it has a road density of 5.0 miles per square mile.

Unusual in this analysis area is that the fifth and sixth field watersheds are displaying moderately high road densities and levels of harvest. The usual pattern on the west side of the Siskiyou National Forest is that some seventh field watersheds or WAAs will have moderate to high prior management levels, but others will be undisturbed or have low levels of management, so that the average over the larger sixth and fifth fields will be low. With the configuration of this analysis area in parallel small tributaries to the Rogue River, instead of convergent tributaries to a single mainstem, the effects of these moderately high management levels would be primarily to the individual streams in which they occur. The cumulative aspect of the effects would tend to be dispersed, rather than concentrated.

***Information Needs:*** Stream channels need to be evaluated in the field to determine whether they have been affected by timber harvest and road construction. Watersheds in order of priority (based on data in Table 7) are Wakeup Rilea Creek, Nail Keg Creek, Rogue Face drainages, Silver Creek, Bradford Creek, Painted Rock Creek, Bridge Creek, Rilea Creek, and Jim Hunt Creek.

***Management Opportunities:*** Improve the road drainage on roads that are necessary for present and future access. Decommission roads that present a risk of resource damage and are no longer needed.

**Table 6. Timber Harvest and Roads by Watershed Analysis Area (National Forest Land only).**

| Watershed | Name | Acres | Percent National Forest Ownership | Road Density Miles/SquareMile | Percent Harvested before 1970 | Percent Harvested after 1970 | Percent of Transient Snow Zone Harvested |
|---|---|---|---|---|---|---|---|
| 19F | Lower Rogue face | 18683 | 0 | unknown | unknown | unknown | No T-Snow Zone |
| 19F01W | Jim Hunt Creek | 3790 | 28* | **3.1** | 0 | 10 | 8 |
| 19F02W | Kimball Creek | 2359 | 44* | 1.7 | 10 | 12 | 12 |
| 19F03F | Face between William Miller and Kimball | 4072 | 37* | **4.2** | 0 | 7 | No T-Snow Zone |
| 19F04F | Face between Quosatana and William Miller | 2391 | 55* | **4.0** | 0 | 12 | No T-Snow Zone |
| TOTAL 19F | | 31295 | 16* | **3.6** | 2 | 10 | 7 |
| 19Q | Quosatana Creek | 16416 | 84 | 2.6 | 10 | 10 | **21** |
| 21L01F | Rogue face above Quosatana | 4299 | 76* | **3.3** | 8 | 6 | No T-Snow Zone |
| 21L02W | Silver Creek | 6047 | 5* | **4.2** | **36** | 6 | No T-Snow Zone |
| 21L03W | Bradford Creek | 2350 | 93 | 2.0 | **22** | 12 | **34** |
| 21L04W | Bill Moore Creek | 825 | 99 | 1.9 | 2 | 6 | 3 |
| **21L05W** | Wakeup Rilea Creek | 1907 | 86 | **5.0** | **22** | **37** | **53** |
| 21L06F | Rogue face above Wakeup Rilea | 3441 | 92 | **3.3** | 13 | 11 | **37** |
| 21L07W | Tom East Creek | 2241 | 74* | 2.7 | 0 | 14 | 10 |
| TOTAL 21L | | 21110 | 62* | **3.5** | 12 | 13 | **30** |
| 21U01W | Nail Keg Creek | 2292 | 100 | **4.3** | 4 | **26** | 18 |
| 21U02F | Rogue face above Nail Keg | 3120 | 99 | 2.7 | 10 | **15** | **20** |
| 21U03W | Bridge Creek | 1691 | 99 | **3.3** | 2 | 13 | 3 |
| 21U04W | Stonehouse Creek | 1479 | 100 | 1.4 | 0 | 10 | 15 |
| 21U05W | Painted Rock Creek | 1420 | 100 | **3.3** | 2 | **23** | **36** |
| 21U06F | Rogue face above Painted Rock Creek | 2649 | 71* | **4.0** | **23** | 5 | **56** |
| 21U07W | Tom Fry Creek | 890 | 92 | 2.6 | **21** | 5 | No T-Snow Zone |
| 21U08W | Rilea Creek | 380 | 71* | **3.7** | 0 | 5 | No T-Snow Zone |
| TOTAL 21U | | 13921 | 93 | **3.2** | 8 | **15** | 18 |
| TOTAL 19+21 | | 82742 | 54* | 3.3 | 9 | 12 | **22** |

*Harvest outside of National Forest land may influence flows in these watersheds.

***What are the basic morphological characteristics of river valleys and channels and the sediment transport and deposition processes in the watershed?***

The analysis in this section is based primarily on review of aerial photos on file at the Gold Beach Ranger Station. These photo flights began in 1939. The portion of the watershed analysis area that is on National Forest land is covered in aerial photos of all years on file. The portion outside the National Forest, roughly from the mouth of Lobster Creek to the mouth of the Rogue River, is only covered in the 1940 series and 1997 photos, with additional coverage of the entire Rogue River corridor in 1969.

**1939-1940-1941**: This photo series is used as a reference condition. The last flood on the Rogue River prior to these photos was in 1927, but there is little evidence of flooding on tributaries. The overwhelming evidence of disturbance in the watershed is from fire. Vegetation is noticeably smaller over much of the landscape, and miles of ridgetops are bare. Small trees are beginning to grow in along edges of meadows.

Terraces along the Rogue River and high gently rolling prairies have been settled, but there is little to no inland development, and no timber harvest on National Forest land.

**1956-1957:** This photo series is after the 1955 flood. There is still little to no harvest or road construction on National Forest land. The photos show the effects of the flood event on channels and riparian areas in a natural condition.

**1964:** Harvest and road construction have begun on National Forest land, but there have been no major storms since 1955. These photos show the pre-1964 flood channel and riparian conditions.

**1969:** Harvest and roading are extensive. There was a major flood on both the river and the tributaries in December 1964. Comparison of areas with and without harvest and roads as they appear on 1964 and then 1969 photos shows the effects of a flood event on stream channels and riparian areas in a harvested and roaded landscape, compared to effects in an undisturbed landscape.

**1973 infrared photos:** These have particularly good resolution, and the infrared coloring helps to distinguish vegetation types and eroded ground. More timber harvest and road construction has taken place since 1969, and there was a major storm in watersheds of tributaries during the winter of 1972-73. These photos show additional effects of storms on stream channels in a harvested and roaded landscape.

**1979 true color photos:** These were 1:24,000 photos, with poor resolution. There was little increased harvest on National Forest land, and no major storms. Although stream channels and riparian areas probably experienced some recovery, it is difficult to determine with the poor photo quality. Therefore, this photo series was not used for this analysis.

**1986:** These were 1:12,000 photos, with good resolution. They show recovery of channels and riparian areas during an era of lower harvest and road construction, with no major storms.

**1997:** These were also 1:12,000, with good resolution. With the rate of road construction and timber harvest greatly slowed, these photos show the existing condition including the few additional roads and areas harvested in the late 1980s and early 1990s. The first major storm since 1973 was in 1996-97. These photos also show where this storm caused increased landslides and channel activity.

## Rogue River, below Agness

### *Channel Morphology*

**Illinois River to Blue Jay Creek, river mile 27.0 to 25.2:** The Rogue River is confined here, but has terraces nearly half a mile wide that slope up for 100 feet elevation. These may have been formed by extreme flood events in the geologic past, where flows from the Rogue and Illinois backed up behind Copper Canyon and deposited their sediment loads.

**Blue Jay Creek to Painted Rock Creek, river mile 25.2 to 24.0:** This is Copper Canyon, a narrowly confined segment that acts as a bottleneck during flood events. Overall orientation is east to west, with sharp bends as it flows between the irregular rock walls of the canyon. The elevation of major flood events can be seen reflected in the sharp vegetation line on the south bank between Blue Jay and Morris Rodgers; and on the north bank below Painted Rock. The amount of small vegetation within the scour line varies between photo years, but the location of the line appears unchanged.

**Painted Rock Creek to Bill Moore Creek, river mile 24.0 to 17.0:** The slope of the canyon walls decreases. There are riffles in the channel, but no large depositional bars. Orientation is northeast to southwest.

**Bill Moore Creek to Lobster Creek, river mile 17.0 to 11.0:** The river is confined, but valley walls continue to widen, with narrow depositional bars interspersed along the channel. Channel orientation is east to west.

**Lobster Creek to Ferry Hole, river mile 11.0 to 5.0:** The valley walls continue to widen. The channel meanders between gravel bars, but the meanders have fixed locations. The bars change volume, but not location or shape. Orientation fluctuates, but overall is northeast to southwest.

Photo coverage from Lobster Creek downstream is 1940, 1969, and 1997. In these photos, the only obvious changes are between 1940 and 1969, and are probably the result of the 1964 flood. On the 1969 photos the vegetation line is noticeably higher, and gravel bars appear more extensive.

**Rogue River Estuary, "the ferry hole" at river mile 5 to mouth:** The river is moderately unconfined in this segment. The channel meanders, with the low water channel moving laterally as it erodes and deposits material, and two or three active channels in some areas. The extent of meandering is limited by hills rising on both sides of a mile wide valley (see Map 6, Slope Classes). The orientation of the river flow is to the southwest.

In this estuary area where the river level rises and falls with the tides, changes at the mouth have the potential to reflect upstream to changes in river meander and deposition patterns. Channel changes between 1940 and 1969 photos could reflect effects of the floods of 1955 and 1964, plus effects of the construction of the north and south jetties at the mouth. Channel changes between 1969 and 1997 photos could reflect effects of the lesser flood of 1997, plus effects of construction of the boat basin jetty.

Following the channel from its fixed location at the mouth of Jim Hunt Creek (river mile 6.0) downstream over the 1940, 1969, and 1997 photos, the river appears to be attempting to add meanders. The main channel flows along the right bank in a single smooth curve from Squaw Creek (river mile 5.5) to the ocean in 1940. In 1969 the main channel is beginning to migrate to the left bank near river mile 4.0, and a portion of the 1940 channel is reduced to backwater near river mile 2.0. By 1997 the channel has shifted left near the mouth of Saunders Creek (river mile 3.2), shifted to the right near river mile 3.0, then split and crossed back to the left bank above a rocky point (river mile 1.6).

At this rocky point, the valley narrows to a half mile wide. From here to the mouth another process appears to be shaping the channel. The river has deposited material that stabilized and vegetated with large willows, forming a bank with a continuous line from the rocky point to the boat basin jetty, effectively cutting the active channel width in half, except during bankfull events.

***Sediment transport***

The river descends with an average gradient of 0.06 percent through the 27 miles of this analysis area. Although this gradient is low, large flows give the river the stream power to transport boulder-sized sediment and regularly move material in depositional bars of cobble-sized material.

Sediment transport in the river interacts with flows and sediment in tributaries. Following the flood event on tributaries of the lower Rogue in November 1996, large alluvial fans were observed at tributary mouths. In December there was a storm that produced bankfull flows on both the Rogue and its tributaries. Following this event, the alluvial fans were greatly diminished or removed entirely, as the Rogue transported the material downstream. Following the January 1997 Rogue River flood, midstream and lateral gravel/cobble bars in the river had increased in depth an estimated 6 feet, as the river brought sediment from higher in the basin. The backwater often created as high flows from the river extend upstream in the tributaries complicates these interactions.

**Tributaries to the Rogue River, below Agness**

Only those streams with National Forest land in a portion of their watershed will be discussed here. Most of these tributaries to the Rogue River in this analysis area are steep, transport streams with gradients from 4 percent to over 50 percent (see also Subwatershed Descriptions under Geology, pages 10-12, and Stream Profiles, pages 13-16). Characteristically, the sediment delivered from the erosion processes described in the Geology section is transported through these streams to the Rogue River. Several streams have flatter depositional reaches near their mouths, and these are discussed below.

Field observations from the Lower Rogue River Trail in spring 2000 found that tributaries entering the north bank of the Rogue River appear to be actively downcutting, regardless of development history (agricultural, timber harvest, road construction, or undisturbed). This downcutting may be related to rapid rates of tectonic uplift discussed in Geology, page 7, and the soil types through which they flow, primarily Colebrooke schist. Smaller streams appear more incised, with vertical exposed soil banks. Larger streams, primarily named streams, tend to have well-developed channels that appear moderately active, armored with boulders to six feet diameter.

**Tom Fry Creek** has an average gradient of one to two percent for debris from the ravelly slides in the upper drainage the first 0.4 mile upstream from the mouth. This would be expected to be a depositional reach. The riparian vegetation is primarily small hardwoods above Agness Road 33, and large conifers below.

**Rilea Creek** has little apparent change in riparian condition over the photo series, other than portions with harvest and road construction. Roads closely paralleling the channel appear on the 1957 photos; in 1973 portions of the lower channel that have been recently harvested are exposed, and sediment is visible. In 1997 the riparian area has a closed canopy, with large hardwoods in the lower channel, small hardwoods midchannel, and a mixture of hardwoods and conifer in the undisturbed upper channel.

**Blue Jay Creek** had a closed canopy of mixed conifer and hardwood in 1940 and 1957. In 1964 a road crosses mid channel, and the canopy has been removed from much of the lower half of the channel. The harvested portion of the channel has unstable banks in 1973, with several small slides in this section and downstream. By 1986 these banks are revegetating. In 1997 the lower half has a closed canopy of small hardwoods, and the upper half is mixed hardwood and conifer.

**Morris Rodgers Creek** is short, steep, and bounded by steep slopes. The lower west slope is sparsely vegetated with small, scattered hardwoods in 1940. Vegetation has increased by 1955. The slope shows progressive ravel from 1964 to 1969, with this entire portion of slope raveled and devegetated by 1973, and sediment deposited in the channel. The first harvest unit in the Morris Rodgers drainage was in the early 1970s, but there is no apparent erosion from the access road or the clearcut channel, and there is over a mile of undisturbed riparian canopy between the harvest and the first ravel site. By 1997 the ravelly slopes are revegetating with small hardwoods, and the stream channel has a dense canopy of the same.

**Painted Rock Creek** has several nearly parallel channels draining the headwaters, one of which flows directly out of Lake of the Woods. The stream profile of this creek reflects the slump earthflow topography discussed in the Geology section. In 1940 the channel was well vegetated with mixed hardwood and conifer. There were narrow openings or chutes from the western ridge to the channel, just below the lake. In 1964 the ridgetop road had been constructed. A landslide into the main channel, downstream of the chutes, had created an opening in the riparian canopy extending about a half mile downstream. This opening appears to have widened in the 1969 photos. By 1973 the first timber had been harvested from a unit above the slide, which included removal of the riparian canopy from the channel draining the lake. The channel below the slide was revegetating with small hardwoods. The chutes from the ridge to the channel appear much wider. A true color flight in 1977 shows trees removed from corridors along the chutes and the adjacent ridgetop road. In the stream channels, all but the landslide have grown in. By 1997 the channels have revegetated, except the area that was harvested in the early 1970s, the landslide, and two small slides into channels below the late 1980s harvest units.

**An unnamed stream** that flows into the south bank of the Rogue River across from Painted Rock Creek has an unstable bank in some places, with old bare slopes. A dense hardwood canopy obscures most of the channel. The headwaters channels were clearcut in the early 1980s. These channels have scattered small vegetation in 1997.

**Stonehouse Creek** has a dense conifer canopy along channels on the west side of the drainage in 1940, and moderately dense mixed hardwoods and conifer on the east side. In 1957 there are some new stream bank slides. In 1973 the canopy along the upper, eastward flowing main channel is partially open. By 1997 these areas have revegetated, the channel has a closed canopy and appears stable, in spite of road construction and timber harvest between 1980 and 1990.

**Sundown Creek** has a closed canopy of conifer on the west bank, and a moderately closed canopy of hardwoods on the east bank.

**Bridge Creek (also called Ram Creek):** The outline of a 40-acre landslide that enters the creek about a mile up from the mouth can be seen on the 1940 photos. By 1957 the slide has reactivated, and the area has little standing vegetation. In 1997 there is a large bare scarp at the top, and the area is vegetated with alder, except for a small streambank slide at the toe. Throughout the aerial photos, there is no apparent change in riparian canopy in Bridge Creek below the slide.

Three parallel roads cross steep perennial streams in the headwaters of Bridge Creek: 3340900, 905, and 907. Although road gradients are nearly flat and diversion potential is low, the multiple crossings of the same streams create the potential for cascading effects. The two upper spurs are growing in with vegetation and are no longer drivable, increasing the potential for culvert problems to go unnoticed.

Along the streams crossed by these roads, all of the large conifers were removed from the riparian area in the early 1970s. No apparent effects on stream bank stability are visible in 1973 or subsequent aerial photos. By 1997 these riparian areas have revegetated with a dense hardwood canopy.

**Schoolhouse Creek** has a dense conifer canopy throughout the photo period.

**Nail Keg Creek** has a closed canopy over the entire photo period, except where Agness Road 33 loops around the creek near the mouth. This area was harvested between 1973 and 1977, with a narrow strip of hardwoods left in the channel. By 1986 it had grown in with alder. The gradient reflects the slump earthflow features

A pond in the headwaters of this creek was enlarged through construction of a dam in 1988. The following winter a small landslide occurred below the pond. A field investigation determined that the increase in water level in the pond increased both ground and surface water flowing through an unstable swale, triggering the landslide.

**Tom East Creek** has a large depositional fan at the mouth. It is unknown how much of this material is from the creek, and how much from the Rogue River. Stream channels are vegetated with a dense canopy of alder, and conifer forest outside the riparian area. This appears little changed in the lower channel over the photo period from 1940 to 1997. In the middle portion of the channel, and one tributary flowing from the west, there are riparian openings and small bank failures on the 1957 and 1964 photos.

The headwaters slopes, including small tributary channels, were clearcut harvest both inside and outside the National Forest beginning in the late 1960s. Nearly a mile of riparian area along the headwaters tributary paralleling Road 3340900 was harvested in the early 1970s, but no effects on stream bank stability are visible in the 1973 photos. The riparian openings are revegetating with hardwoods by the next series of aerial photos, and the canopy is closed by 1997.

**Slide Creek** in 1940 had a riparian canopy of small dense vegetation. In 1957 about one third of its channel length has open canopy, with bare ground underneath. By 1997 the riparian area has revegetated.

**Wakeup Rilea Creek** in 1940 had a closed canopy of large conifer, with some hardwoods in the channel. Most of the lower mile of this stream and tributaries were harvested and tractor yarded in the late 1960s and early 1970s. On the 1973 photos there is no apparent stream bank instability or other effects to channels. By 1997 the riparian canopy is closed, primarily with hardwoods. The lower watershed is a mosaic of different ages, densities, and species of stands; the upper watershed is a patchwork of managed and natural stands.

This creek has the undulating profile characteristic of slump-earthflow terrain. Changes in gradient are much more pronounced on site than they appear on the stream profile, which was plotted from a 40-foot contour interval map. Channels appear stable on the aerial photos, but field investigations found evidence of large sediment loads. Gravel-sized material enters the channel from slump-earthflow features, is transported through steep, 10 to 40 percent gradient reaches, and deposited in flatter 2 to 4 percent reaches. Deposits are subsequently remobilized by peak flow events and streambanks are eroded, contributing to the volume of sediment.

The channel also has many pieces of large wood that help to organize sediment deposits. Earthflows deliver mature trees; twisty cascades and flat landslide deposits trap the logs. Various decay stages, from trees with needles to almost totally decomposed remnants attest to the ongoing nature of this process, and suggest that few pieces of large wood are delivered out to the Rogue River.

**Bill Moore Creek** has an active slump-earthflow feature, referred to in Forest Service files as the "Moorsky Slide" (see discussion in Geology section). The lateral streams bordering this earthflow are Bill Moore and Tom Moore Creeks. Their confluence is on the downhill side of Agness Road 33, just before they enter the Rogue River.

On the 1940 photos, there is little riparian vegetation on Bill Moore Creek. In 1969 a large alluvial fan appears at its mouth in the Rogue River. By 1997 the channel has revegetated and the fan is shorter.

**Bradford Creek:** Detailed information on this creek and its watershed are in the Bradford Creek Watershed Analysis, 1996. The creek drops steeply into the Rogue River, but has a depositional reach with a 4 percent gradient about a quarter mile upstream. In 1997, following the November 1996 storm, field observations found changes in this reach. The riparian canopy had opened, the channel had widened by about 50 percent, and a portion of the terrace that was deposited in the 1960s had been removed. Tree boles that had been covered for 30 years were exposed, with noticeably smaller diameters in the previously buried portion than further up the stem.

**Silver Creek** has a gradient of 1 to 4 percent for the first 2.6 miles upstream from its mouth. The first quarter mile has an open canopy in the 1940 photos, with sediment in the channel. Riparian vegetation above there is small hardwoods. This was prior to timber harvest and roaded access, and appears to be the natural condition. An alluvial fan at the mouth appears in all photo series. It pushes a small curve into the low water channel of the Rogue River, forming a riffle.

**Quosatana Creek:** Detailed information on this creek and its watershed are in the Quosatana Creek Watershed Analysis, 1996. The storm event of November 1996 activated landslides along inner gorges of tributaries and the mainstem, delivering large amounts of sediment to stream channels. Two washouts on Road 3313 contributed relatively minor amounts of sediment. Much of the increased sediment was deposited in the 2.5-mile depositional reach that ends at the mouth. In the summer of 1997 pools had filled in and flow was often subsurface in this reach. Willows and other small riparian vegetation were buried. By 1999 the channel and pools were reforming, and vegetation was recovering.

**Kimball Creek** has a gradient of 2 to 4 percent for the first half mile upstream from its mouth. At the time of the 1940 aerial photos, neither harvest nor road construction had occurred within the drainage. There were two landslides into the stream channel near the headwaters. The first 0.25 mile above the mouth was aggraded with a wide riparian opening, and there was an alluvial fan in the Rogue River at the mouth. These would indicate that the stream naturally receives and transports a large amount of sediment.

On the 1957 aerial photos, harvest and road construction had begun, and by the 1964 photos most of the acreage west of Kimball Creek and some east of the creek had been harvested. Sediment trails from roads, skid roads, and clearcuts led into the creek and its tributaries. The riparian area at the mouth had been clearcut, and the aggradation is noticeably increased. After the 1973 winter storm event, a debris flow approximately 100' long by 300' wide appeared on the photos, entering Kimball Creek near the center of Section 18. By the 1986 photos, most of these areas appear to be recovering. Although present condition appears stable on photos, the actual stream channel condition is unknown.

Harvest of riparian vegetation along most of the length of the Kimball Creek mainstem and its tributaries on the west removed sufficient shade that stream temperatures may have increased following harvest. These harvested riparian areas appear to have grown back with hardwoods. The amount of streamside shade today and stream temperatures are unknown.

Riparian harvest also removed large wood both in the channel and future large wood. It is unknown how much of the revegetation is coniferous. If the conifer component is comparable to pre-harvest levels, it will be another 50 years before it is large enough to provide stream structure. If conifers are a smaller riparian component than before harvest, recovery of large wood and the channel structure it provides will take longer.

**Jim Hunt Creek** has an undulating profile suggestive of slump-earthflow features, but may be caused by different weathering rates of the different rock types in this subwatershed The gradient of one percent for the first half mile upstream from its mouth appears aggraded in 1940. By 1969 deposition has increased, with a large fan in the Rogue River. This could be a result of flood events in 1955 and 1964, or harvest and road building activities, or both. By 1997 the amount of sediment in this reach appears similar to 1940.

Most of the lower watershed appears harvested on recent aerial photos. However, the natural vegetation in 1940 was mixed conifer, hardwood, and brush, so many areas were partially cut. Riparian vegetation appears small, with few tall conifers in the 1940 photos. In the 1982 photos vegetation in the channel also appears small, with some small inner gorge landslides.

The natural condition in this stream may have been a moderately heavy sediment load, with moderate shade and large wood.

The Signal Butte grazing allotment includes the headwaters of Jim Hunt Creek. Field observations in 1995 found that cattle appear to be using old, deeply rutted and undriveable roads as trails, dispersing out onto meadows in the headwaters of Saunders and Hunter Creeks. Jim Hunt Creek had densely brushy slopes, with the channel entirely shaded by shrub species. No cattle paths were found leading into the creek.

***Information Needs:*** Stream channels need to be evaluated on site, to determine if roads or other management activities are affecting them. Increased flows from timber harvest and concentrated flows from roads could destabilize stream banks; increased sediment could aggrade or destabilize channels. Roads need to be evaluated for potential stream crossing failures and stream diversions. Priority watersheds are Wakeup Rilea Creek, Nail Keg Creek, and Bridge Creek.

***Management Opportunities:*** Treat roads that are causing or have the potential to cause damage to stream channels, by improving drainage and stormproofing roads that will be left open, and decommissioning roads that are determined to have little future need.

### *What beneficial uses dependent on aquatic resources occur in the watershed? Which water quality parameters are critical to these uses?*

The Rogue River and its tributaries in this watershed provide habitat and migration routes for anadromous fish, some species of which are listed as Threatened or Endangered (see Fisheries section). They also provide water for domestic use and irrigation. The river provides recreational boating, fishing, and swimming, including habitat for commercial fishing guides and tourboats.

#### Turbidity

Turbidity in the Rogue River varies over the course of the year, but is never absent. River color changes from green to brown with influx of sediment from storms or landslide activity in its major tributaries. Its turbidity has been attributed to algal growth in the summer, or to the various human activities on the land it drains: agriculture, urban, mining, timber harvest. It may be a natural condition, the cumulative effects of its geology and landforms aggregated over a basin of its size. One theory on the origin of its name is that it was a misspelling of "rouge" or red, from its reddish muddy color during storms. At the upstream end of this analysis area, the confluence of the Rogue and Illinois Rivers, the characteristic clarity of the Illinois contrasts with the Rogue as they flow side by side.

The tributaries are typical of coastal Siskiyou streams, running clear during most of the year. Turbidity during winter storms clears within a few days. Exceptions are the streams with large slump-earthflow features or other active landslides, which may contribute fine sediments at any time. Turbidity related to landslide activity is episodic and quite noticeable against the background water clarity.

## Temperature

This section of the Rogue River was listed as water quality limited for temperature and pH in the 1996 and 1998 Oregon Department of Environmental Quality listing. Quosatana Creek was listed as water quality limited for temperature, exceeding the state standard of 64 degrees for this area. Recording thermometers have monitored temperatures since 1991 (see Map 10, Temperature Monitoring Sites).

**Table 7. 7-Day Average Maximum Temperatures**

| Stream | Site | Years | Range of 7-Day Max |
|---|---|---|---|
| Rogue River | Crooked Riffle | 1993-1998 | 72.3 to 77.6 |
| Rogue River | Near Bradford Cr | 1996 | 75.4 |
| Rogue River | Kimball Bend | 1994-1996 | 74.3 to 75.8 |
| Bradford Creek | Near mouth | 1992-1999 | 59.5 to 61.73 |
| Quosatana Creek | West Fork mouth | 1995 | 63 |
| Quosatana Creek | East Fork mouth | 1995 | 64.4 |
| Quosatana Creek | River mile 2.5 | 1993-1997 | 63 to 66.9 |
| Quosatana Creek | Near mouth | 1991-1999 | 66.4 to 70.9 |

Release of water from dams constructed at Lost Creek and Applegate during the summer months may affect stream temperature in the Rogue River. Increased flow and release of water from the lower portions of the reservoirs would both have a cooling effect. Data on pre-dam temperatures have not been found.

Along tributaries, removal of riparian shade through timber harvest may have caused stream temperatures to rise (see discussion of riparian condition under Riparian Ecosystem).

***Information Needs:*** Riparian vegetation should be evaluated for actual versus potential effects on stream shade.

***Management Opportunities:*** Treat riparian stands that have the potential to increase shade by thinning overstocked areas and/or planting trees in under-stocked areas.

## Fisheries

### *What is the character of fish populations in Rogue River below Agness?*

Salmon and trout in the Rogue River below Agness are members of the lower Rogue River stocks. They share life histories and population trends with salmonids produced from the mouth of the Rogue River upstream to near Stair Creek at river mile (RM) 43 of the Rogue, excluding the Illinois River, which enters at Rogue RM 27.

Nearly all fish production in the lower Rogue basin occurs in tributaries. Winter flows in the mainstem are too powerful and can mobilize the stream bottom of the mainstem, destroying eggs laid in the gravel. The lower Rogue River flows through a narrow canyon with short, steep tributaries. Few tributaries have well-developed habitat for salmonids. Below Agness, only Lobster and Quosatana Creeks offer extensive salmonid habitat. These two watersheds are covered in separate Watershed Analyses. The tributaries covered in this discussion are short and steep and generally provide steelhead, anadromous cutthroat and resident trout spawning and rearing.

Characteristics of lower Rogue River salmonids are that fish spawning here tend to enter the river at the end of the adult migration runs, the juveniles enter the ocean earlier than upriver fish and in the ocean, they migrate south and stay close to shore (Rivers, 1991 and Meehan and Bjornn, 1991).

Lower Rogue River fish have shared the historic decline in numbers witnessed throughout the Rogue River since the late 1800s. The most telling example of the decline is the output of the salmon canning industry centered out of Gold Beach, at the mouth of the Rogue. Fish caught in the river from the mouth up to Lobster Creek were the basis of the industry. In 1861, entrepreneurs in the fish canning industry labeled Rogue River runs as large, or larger, as any in Alaska. A canning industry thrived at Gold Beach into the 1930s. At the peak of fish canning, packs contained up to 82,500 adult chinook in 1917 and 50,500 adult coho in 1928. However, when the state legislature finally banned commercial fishing on the Rogue River in 1935, the action was virtually unopposed because fish were so scarce the canning industry could not support itself (Rivers, 1991). Besides over harvest, factors contributing to this initial steep decline of Rogue River fish included climatic changes and dams, mining and water diversions in the upper basin (Rivers, 1991). From 1922 to 1935, 6 million pounds of salmon were canned (Jerry's Rogue Museum).

Four species of the genus *Oncorhynchus* (Pacific salmon and trout) use the Rogue River below Agness. Coho (*O. kisutch*) and chinook (*O. tshawytscha*) are the traditional Pacific salmon. All individuals must migrate to the ocean and each adult is capable of making only one spawning run from the ocean, after which it must die. *O. mykiss* (the Latin name for both steelhead and rainbow trout) and *O. clarki*, cutthroat trout, have more flexible life histories. Both resident and anadromous populations of each exist in the lower Rogue River. Individuals of these species can make more than one return migration to freshwater and can spawn more than once in their lifetime. These life histories are typical of the species throughout their ranges, not just in this section of the Rogue River.

Because of the diversity of salmonid stocks, which use the upper Rogue River, there are adult fish below Agness throughout the year. These fish are the basis of both a world-class sport fishery and of the culture of the human communities along the Rogue River. Anglers support a large portion of the economies of the communities of Agness and Gold Beach. Numerous lodges and guide businesses have developed to serve these anglers.

Non-salmonid species of fish in the lower Rogue River include the anadromous Pacific lamprey (*Lampetra tridentata*), whose populations are suspected to be in decline throughout their range, yet about which very little is known. There are potentially three species of sculpin (genus *Cottus*) in lower Rogue River: coast range (*C. aleuticus*), prickly (*C. asper*) and reticulate (*C. perplexus*). Redside shiners

(*Richardsonius balteatus*), a non-native minnow, were first detected in Jump Off Joe Creek near Grants Pass in the 1950s (Rivers, 1991). Three-spined sticklebacks (*Gasterosteus aculeatus*), brook lamprey, squawfish, and small mouth bass also occur in the lower Rogue River (Ernie Rutledge, personal communication).

In addition to naturally spawning fish, culture has long been a part of the watershed. A hatchery has existed in Indian Creek, along the estuary of the Rogue River since the mid-1850s. Fall chinook adults return to the mouth of Indian Creek and are collected there as broodstock. Historically, however, this hatchery used upper Rogue spring chinook as broodstock.

**Coho Salmon**

Coho in the Rogue River are part of the Southern Oregon/Northern California group, which was listed as Threatened in 1997 under the federal Endangered Species Act. The distribution of these coho extends from the Elk River in Oregon south to the Mattole River in California. The estimated abundance of these coho ranged from 150,000 to 400,000 spawning fish. Today, the group is down to approximately 10,000 naturally produced adults. The Rogue River is one of the major remaining coho producers (NMFS, May 6, 1997). Within the Rogue River, coho predominantly spawn and rear in the upper Rogue and the Illinois Rivers. The upper Rogue population is mostly hatchery fish. Most wild coho production in the Rogue occurs in the Illinois River tributaries. The population of adult spawners in the Rogue River was calculated for the years 1990 through 1996 based on mark and recapture seining at Huntley Park, river mile (RM) 8. During that time, coho adults averaged 3401 individuals, with a low of 174 in 1993 and a high of 5386 in 1996 (Nickelson, 1998). The same report estimates that a total of 5400 adult spawners are needed to fully seed the best habitat. Because of the historic lack of classic coho habitat features, lower Rogue coho spawners are believed to be strays from the upper Rogue River or Illinois River groups and not remnants of a discrete lower Rogue River population. Below Agness, coho spawn in low numbers in the South Fork Lobster and in Silver Creek. Coho have also been seen in a tributary to Quosatana Creek. However, it is likely that when coho populations were higher, a larger number of strays used the marginal habitat available in lower Rogue River tributaries.

Adult coho enter the Rogue River in the late fall to spawn. Eggs incubate in gravel streambeds until early spring when the fry emerge. Juvenile fish will stay in their natal streams for over one year congregating in the medium-sized streams. They migrate out of the system in late spring of their second year of life. Most Rogue River coho spend two years in the ocean before returning to spawn (Rivers, 1991). Since juvenile coho spend a full year in mid-sized streams they depend on high quality habitat features throughout that year. High summer water temperatures (in the upper 60 degrees Fahrenheit), little instream cover or slackwater areas to escape high flows in winter and a general low-density of instream wood are habitat features of the mid-sized streams that do not promote coho production (see Temperature Section). These conditions are typical of mid-sized streams in the coast range of southern Oregon, where coho production is low. These conditions do not affect other salmonids to the degree that coho are affected. Chinook migrate out of tributary streams by mid-summer and do not overwinter there, avoiding both high summer water temperatures and high winter flows. Steelhead and cutthroat rely on smaller tributaries, which are cooler than larger streams in summer and have lower flows in winter.

**Fall Chinook**

Rogue River fall chinook are part of the Southern Oregon and Northern California Coastal Evolutionarily Significant Unit (ESU). The range of this ESU is from Cape Blanco, Oregon south to the Klamath River in California. This ESU was proposed for listing as Threatened under the federal Endangered Species Act, but was determined to not warrant listing in September 1999.

Fall chinook salmon in the upper Rogue River were identified by NMFS, March 9, 1998 as the only relatively healthy population in the entire ESU. This is a stream-type stock, meaning that juveniles typically enter the ocean during the second year of life, migrate further distances in the ocean, enter freshwater as spawners early in the fall and then migrate long distances to headwater streams (Healy, 1983). Lower Rogue River chinook are ocean-type fish. They enter the ocean within the first year of life and stay relatively close to shore, then enter freshwater to spawn late in the fall of their third year of life and spawn in streams low in the system.

During the late 1980s, the combination of drought, stream habitat degradation, low ocean survival and high ocean exploitation rates in the Klamath Management Zone resulted in a severe decline in chinook populations in all of the Oregon coastal basins south of Elk River. River angling for chinook in several southcoast basins, including the lower Rogue River, was closed during this time. Populations began to improve in 1991 with a sharp curtailment in ocean harvest coupled with the end of drought conditions by 1993 (ODFW, 1997). Juvenile trapping data show a positive trend in smolt production in lower Rogue River tributaries since the early 1990s. The sport-angling season in the lower Rogue River still closes on September 30 to protect these chinook. Prior to September 30, the fishery in the lower mainstem is targeting spring chinook, which spawn in the upper Rogue River.

Adult fall chinook enter the Rogue River in late summer and disperse throughout the watershed to spawn as streamflow allows. Spawning is usually completed by the end of December, after which all chinook die. Fry emerge from the gravel in the spring and start migrating downstream almost immediately. Downstream migration peaks between the end of May and the middle of July and then continues at a declining rate throughout the summer (ODFW, 1997). During mild winters some juveniles can stay in the river. In the spring of 1998, 123 one-year old chinook were caught in the Lobster Creek juvenile migrant trap (ODFW, 1998). After migrating out of freshwater, these chinook will spend two or three years in the ocean before returning to spawn.

**Winter Steelhead**

Winter steelhead in the Rogue River are part of the Klamath Mountains Province (KMP) ESU. This ESU was proposed as Threatened under the Endangered Species Act in 1996. However, in 1998 the ESU was determined to not warrant such a listing, based on recovery efforts in the states of Oregon and California. The ESU extends from the Elk River in Oregon south to, and including, the Klamath River in California. The NMFS estimates the current abundance of this ESU to be 85,000 with an historic abundance of greater than 275,000 (NMFS, July 1996). The ODFW estimates that the population of winter steelhead in the Rogue River between 1970 and 1987 averaged 44,000 adult spawners annually. The same estimate since 1990 is 55,000 adults, which indicates a positive trend in the population (RVCOG, 1997).

Winter steelhead spawn in tributaries throughout the lower Rogue River. Steelhead have a more variable life history than coho or chinook. They can spend one to several years rearing in freshwater and can survive reproduction to return to the ocean. In streams their sleek body proportions allow them to ascend steeper gradients and use smaller streams for spawning and rearing. They also roam more within a basin to locate suitable spawning habitat. Winter steelhead enter the Rogue River to spawn in the late fall and spawning continues into April. Fry emerge from late spring to early July. Most steelhead will spend almost 2 full years rearing in tributaries before smolting and migrating to the ocean in the spring. After typically 2 years of ocean rearing they will return to spawn. A small percentage of the population will return to freshwater after only one year. These so-called "half-pounders" are sexually immature and will return to the ocean again before making a spawning run.

**Summer Steelhead**

The Rogue River produces the largest run of summer steelhead in Oregon, outside of the Columbia River system. The only other Oregon coastal streams that produce summer steelhead are the Hood, Siletz and North Umpqua Rivers. The Rogue River is also unusual in that it supports three forms of *Oncorhynchus mykiss* sympatrically: resident rainbow trout, winter steelhead and summer steelhead.

Adult summer steelhead enter the Rogue River from the ocean between May and October. An early run, 10 percent of the population, enters in May, June or July. The late run, 90 percent of the population, enters in August, September or October. Adults hold in pools, completing sexual maturation, until they spawn in the winter (December through March). Fry emerge from gravel nests between April and June. Juveniles rear in tributary streams for two to four years before migrating to the ocean. Summer and winter steelhead have some overlap in time and space for egg laying and rearing activities. They are distinguished from each other mainly by the timing of their adult runs and the degree of gonad maturity upon entering freshwater.

Summer steelhead do not spawn or rear in the segment of the Rogue River below Agness, nor its tributaries. They are a middle and upper Rogue River fish, with important spawning and rearing grounds in tributaries including the Applegate River.

Adult summer steelhead migrate upstream through the Rogue River between May and October. Pre-smolt juveniles migrate downstream from their natal streams to the estuary between April and June.

Rogue River summer steelhead also exhibit an interesting, non-spawning migration known as the "half-pounder" run. Half-pounders are small, sexually immature steelhead 11 to 16 inches long. They return to freshwater with the late-running adults in August and September, after only three to four months in the ocean. Instead of migrating upstream to spawning tributaries, half-pounders stay in the lower and middle Rogue River mainstem over the winter, then return to the ocean in the spring. Half-pounder steelhead are found in the Rogue River below Agness during the autumn and winter.

While 95 percent of summer steelhead exhibit the half-pounder migration pattern, it is not exclusive to them. Approximately 30 percent of the winter steelhead population in the Rogue River will also make a half-pounder run. The reason for the half-pounder run is not well understood. One theory is that these fish follow spawning spring Chinook into the rivers to take advantage of the large food resource provided by Chinook eggs. Another is that the half-pounders are escaping adverse ocean conditions. Other than the Rogue River, half-pounders are found only in the Klamath and Eel Rivers of Northern California.

Summer steelhead use many of the same streams winter steelhead use for spawning and rearing but also spawn in smaller streams, often spawning in streams that dry up during the summer.

Because summer steelhead are in freshwater as adults during the time of lowest flow and highest temperature, they require pockets of cool water. In the section of the Rogue River below Agness, summer steelhead will hold up in deep pools or at the mouths of tributaries that have cool water. Before the Lost Creek Dam was completed in the early 1970s, the summer water temperature of the mainstem Rogue River was two to three degrees warmer than the Illinois River, which enters immediately downstream of Agness. Summer steelhead would stay in the lower Illinois River until the Rogue River cooled in the fall, and then continue up the Rogue River. Now Lost Creek Dam reserves and releases cool water into the Rogue River, and summer water temperatures are usually cooler in the Rogue than the Illinois. As a result, summer steelhead no longer hold up in the Illinois River.

Summer steelhead that spawn in the Rogue River system, especially in the middle Rogue, are the weakest population of the Klamath Mountains Province steelhead ESU. Census information collected at Huntley Park shows a 25 percent decrease in population size since the mid-1980s.

Both summer and winter steelhead are propagated at Cole Rivers Hatchery and released into the Rogue River. Wild fish are not incorporated into the brood stock and little interaction between wild and hatchery stock is thought to occur on the spawning grounds.

**Anadromous Cutthroat Trout**

Both resident and anadromous cutthroat trout occur in the lower Rogue River. Multiple age-classes of cutthroat are consistently present in coastal Oregon streams, and forces driving their complex life histories are poorly understood (ODFW, April 1997). Anadromous cutthroat usually rear in freshwater for two, three or four years before smolting. Yearling cutthroat appear to be displaced from prime habitat by other salmonid yearlings, probably because they emerge later and are, therefore, smaller. They commonly return to freshwater to overwinter without spawning. Females begin spawning at age 4 and can survive to spawn up to 4 or 5 times. Spawning occurs in late winter and early spring (Trotter, 1997).

**Resident Trout**

Both rainbow and cutthroat trout occur in resident forms in the lower Rogue River. They occupy the uppermost reaches of most tributaries and commingle with the anadromous forms throughout the basin.

## *What is the character of fish habitat in the watershed?*

Fish habitat in the analysis area is shown on Map 11, Salmon and Trout Distribution, and can be grouped into three general categories: the mainstem Rogue River, the large tributaries and the small tributaries. Each has a distinct physical and biotic regime.

**Mainstem Fish Habitat**

The dominant habitat feature in the watershed is the mainstem Rogue River, which provides 27 miles of primarily migration habitat for fish. This is a major river, with a low stream gradient, a wide active channel and powerful winter streamflows. It flows through a narrow canyon from river mile 27 down to river mile 17. Active floodplain development is minimal. Perched terraces are remnants of an older baseline. Downstream of river mile 17, the river valley opens up, the gradient decreases further, and extensive gravel bars form. Downstream of river mile 5 tidal waters influence the flow. Large islands form and the river flows through multiple channels. These are important rearing and smolting habitat for salmon and trout (see also Channel Morphology section).

The region receives a high amount of precipitation between October and June and very little the remainder of the year. This results in a flow regime of extremes to which fish respond. During peak flows in late autumn, winter and spring the entire channel is submerged, with only the largest estuarine islands remaining. Further upstream only the inactive terraces are above water. To escape the force of the flow, fish hold on the margins of the channel, in submerged tributary mouths and in eddies behind boulders. Spawning is restricted to the tributaries, where streamflows are lower and do not wash away fish eggs incubating in gravel streambeds.

By late summer the wetted channel is, in many places, reduced to only a fraction of the total channel width, revealing wide gravel bars as well as islands in the estuary. Exposed to the sun, mixed water temperatures rocket into the low 70s during late summer (see Temperature section), and fish hold in cooler water found at the bottom of deep pools and at the tributary mouths During low flow conditions, the wetted channel is separated from the influences of forest riparian vegetation by bare rocks. Seasonal emergent rushes, willows and herbs line the channel margins. By mid-summer, mats of filamentous green algae have developed in shallow water and provide nutrients and structure for photosynthetic, invertebrate and amphibian organisms.

Large wood is absent from the mainstem channel. Powerful storm flow and a wide channel result in large wood being flushed downstream, out of the watershed. Structural habitat diversity is provided by boulders and bedrock outcrops. Deep pools and turbidity provide instream cover. In the lower 5 miles of the river, where islands disperse the force of the river, pockets of large wood accumulate at river bends. These are important rearing structures for juvenile and smolting salmonids.

**Boat Use**

A highly visible element of mainstem fish habitat is the extensive boat use. Boaters are drawn to the lower Rogue River for its celebrated fishery, scenic beauty and whitewater reputation. They bring a wide variety of watercraft and dominant uses change with the seasons.

During the summer small rafts, kayaks and canoes make day trips down the lower Rogue River. Adventure seeking kayakers and rafters occasionally ply the mainstem during high spring and winter flows. Anglers use drift boats during all angling seasons from Agness downstream. Motorized angling boats travel both upstream and downstream during the fishing seasons. Boats access the lower Rogue River from the Port of Gold Beach, near the mouth of the river, and from boat ramps scattered throughout the lower Rogue River. On the National Forest, boat ramps are located at Lobster Creek Campground (river mile 11) and at Quosatana Campground (river mile 14).

Tour boats, take visitors up the Rogue River to view the scenery and wildlife and experience the white water. These are larger craft, carrying up to 60 passengers. From May through October, several trips are made daily. They leave from the port of Gold Beach and travel through the entire lower Rogue River. Small, personal use jet boats travel the mainstem year round for transportation. This level of boat use is not limited to the section of the Rogue River below Agness. Upstream of this section, both rafting and motorized boating continue up into the Grants Pass area.

Studies of the effects of boats on fish have been made, some specifically on the Rogue River. Direct observations were made on fish subjected to a variety of boats in the Rogue River. Fish greater than 5 meters away from a boat generally had no response, fish respond more to oar boats than to motorboats and no fish were found stranded on the bank in the wake of a boat (Satterthwaitte, 1994). In Alaska, it was found that in shallow water jet motors can destroy redds (Horton, 1994). Horton also observed that adult sockeye salmon seldom responded to motorboats, and when they did, they returned to their redds within seconds. He also observed that adult sockeyes always moved off their redds when bears or people walked into the river and did not return for several minutes. Considering the width and depth of the Rogue River, it is unlikely that boats are individually causing serious harm to adult or juvenile fish. The cumulative effect is undocumented. Intuitively, the continued presence of fish after decades of extensive boat use suggests that boats, while likely adversely affecting fish, do not constitute an insurmountable negative force.

Boat docks and launch pads exist in several places throughout the watershed. From a human convenience standpoint, the first choice for launch locations are at cobble and gravel bars, which are abundant throughout the watershed. These are naturally resilient places and the launch facilities rarely require much habitat modification or limit biological productivity. In other rivers with banks of fine, easily eroded soil, motorized boats have decreased bank stability and increased turbidity (Lindsay, 1992). This is not a concern in the Rogue River, where banks are either armored with cobbles or solid bedrock.

### Large Tributaries

Two tributaries in the section of the Rogue River below Agness are large enough to allow significant salmon spawning and/or significant trout rearing. The remaining tributaries have very small drainage areas and are generally too steep to support fish in all but their very lowest reaches. The large tributaries are Lobster and Quosatana Creeks, which enter the Rogue River at river mile 11 and 13, respectively. Each of these creeks has an individual Watershed Analysis completed and neither is discussed in this document.

### Smaller Tributaries

Other than Lobster and Quosatana Creeks, the remainder of the tributaries in the Rogue River below Agness are short, steep and provide limited fish habitat (see Stream Profiles). Jim Hunt, Kimball and Silver Creeks provide limited Chinook, steelhead, and possibly coho habitat. Bradford, Wake-Up Rilea, Nail Keg, Tom East and Painted Rock Creeks provide short segments of steep habitat for resident trout. Tom Fry Creek provides a short segment of Chinook and possibly coho habitat at its very mouth, and more extensive steelhead, anadromous cutthroat and resident trout habitat.

### Estuary

The estuary of the Rogue River extends 5 miles upstream of the Pacific Ocean and contains large islands and multiple channels. This is important rearing habitat for juvenile coho and Chinook. It is also important holding habitat for adult salmon and trout which wait for high winter flows before migrating further upstream.

***Information Needs***: Culverts on small tributary streams need to be investigated for the degree to which they block or impede fish migration.

***Management Opportunities:*** There is a need to prevent sediment delivery from roads throughout the basin, especially in those tributaries known to support fish. Many culverts are reaching the end of their life and threaten streams with mass delivery of sediment. Many roads are no longer needed and can be modified or decommissioned to reduce hydrologic effects.

Riparian forest conditions, which have experienced previous harvest and are now overstocked and stunted, especially adjacent to fish-bearing streams, need to be thinned to allow growth of large conifers. This would increase the potential for shade and large wood in streams.

Culverts determined to be barriers or impediments to fish should be replaced with fish-passing structures, where practicable.

Fire suppression has increased the amount of forested land and decreased the amount of meadow or grasslands in the watershed. Streams that flow through meadows provide different aquatic and riparian habitat and nutrients than those which flow through forests. Restoring meadows to their former range in the watershed would recover the meadow aquatic and riparian processes that have been lost to fire suppression. Aquatic and riparian diversity in the watershed would be restored.

# RIPARIAN ECOSYSTEM NARRATIVE

***What are the riparian processes in the watershed?***

**Stream Types**

The character of a riparian area is inseparable from the character of the water body it surrounds. In this section of the Rogue River, streams are the dominant type of water body. Streams can be grouped, based on the surface flow regime, into three broad categories: ephemeral, intermittent and perennial streams. Likewise, riparian processes and functions can be grouped along the same lines.

An intermittent channel is defined by the ROD (USDA and USDI, 1994) as "any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition" (ROD, B-14). This definition includes both "ephemeral" channels and "intermittent" channels. Ephemeral channels carry only stormflow, while intermittent channels are supplied by groundwater during part of the year (Reid and Ziemer, 1994).

Most ephemeral channels contain water for only a few days of the year and may not support riparian vegetation, so they are unlikely to have much direct significance for riparian-dependant species. Their major role is their influence on downstream channels. They supply sediment, water, and organic materials. Depending on the contrast between the ephemeral channels and the surrounding upland areas, they may or may not be significant migration corridors or unique wildlife habitat. (Reid and Ziemer, 1994).

Intermittent channels are important as seasonal sources of water, sediment, allochthonous material, and large wood. Because intermittent channels can form a high proportion of the entire channel system in a watershed, they contribute significantly to downstream reaches (Reid and Ziemer, 1994). It is therefore important to maintain their function of allochthonous material sources. These small streams are easily influenced by forest management activities and manipulations of the canopy or streambank vegetation can influence the stream's energy supply (Chamberlain et al., 1991). Because they do not have surface flow during late summer, intermittent streams are not a source of warm water to the summer stream network.

Intermittent channels can be important to those amphibian species which do not need open water throughout the year. These streams may be particularly important as nursery areas for amphibians because these sites support fewer aquatic predators than perennial channels (Reid and Ziemer, 1994).

The more different a riparian area is from its surrounding upland - in structure, humidity, thermal regime or nutrient availability - the more important the riparian area is for riparian-dependant species. When riparian areas are distinct from surrounding uplands, they can function as travel corridors and provide microclimatic refuge for riparian-dependant species (Reid and Ziemer, 1994). The distinctive vegetation and higher moisture content of these sites can also modify fire behavior, so their distribution can affect the patchiness of large burns. Since the watershed does not experience long, cold winters, riparian areas here are not critical for providing thermal protection from winter extremes.

Intermittent channels and their riparian zones are highly variable in their ability to provide habitat that is different from the surrounding uplands. Some riparian areas around intermittent channels are identical to the surrounding upland and some have a vastly different character.

Perennial streams, because they have surface flow throughout the year, generally support a riparian area quite distinct from the surrounding upland. The continually wet habitat they provide allows the fuller development of riparian-dependant plant and animal communities. During late summer and early autumn, when the surrounding uplands are typically quite hot and dry in the section of the Rogue River above Lobster Creek, riparian areas along perennial streams become especially important for riparian-dependant species. Organisms, which were previously dispersed into the riparian areas along intermittent streams or into upland areas, congregate along perennial streams to find suitable conditions.

### Nutrient Routing

There are two sources of the nutrients necessary to support riparian-dependent species: **autochthonous sources** (produced on site, usually from photosynthesis), and **allochthonous sources** (produced off-site and transported into the area). Aquatic and riparian ecosystems increase in complexity with the progression from headwater tributaries downstream to the mouths of the mainstem rivers. Allochthonous sources dominate in the upper reaches of the watershed and the availability of autochthonous sources increases further downstream.

Autochthonous sources of energy are affected by stream size, gradient, and exposure to sunlight. Allochthonous sources of energy contribute organic matter to the stream by four main pathways: litterfall from streamside vegetation; groundwater seepage; soil erosion; and fluvial transport from upstream. Organic matter from these sources differs in when and how it enters the stream, how it decays, and where it predominates (Murphy and Meehan, 1991).

Most animals require food with a Carbon to Nitrogen ratio (C:N) less than 17:1. Almost all forms of allochthonous organic matter have higher C:N ratios, so they require microbial processing to enhance food quality. The quality of various forms of organic matter varies widely, as measured by the C:N ratio. At the low nutritional end of the spectrum are woody debris and conifer needles (wood has a C:N ratio of 1,343:1); at the high end of nutritional quality are periphyton, macrophytes, and fast-decaying deciduous leaves (macrophytes 8:1 and alder leaves 23:1) (Murphy and Meehan, 1991).

## *What are the vegetative types of riparian areas in the watershed?*

Riparian zones in this section of the Rogue River can be stratified into four distinct categories based on vegetative characteristics. These are conifer forest, hardwood forest, meadows, and riparian areas on soils developed in serpentinite and peridotite (ultramafic soils). Each category has its own processes for sediment delivery, channel formation, hydrologic regime, susceptibility and response to change, microclimate qualities, flora, fauna, and migration habitat qualities.

### Conifer Forest Riparian

The most abundant riparian type in the Rogue River watershed below Agness is the conifer forest riparian. It is generally located on soils with high to moderate productivity, where water supply is not limiting growth and topography tends to exclude frequent or intense fire. Abundant, tall conifers dominate these riparian areas. Douglas-fir is by far the most common overstory conifer, with Port-Orford-cedar often present. Pacific yew has very scattered distribution.

The stand canopy is closed in these areas and many stands have multi-layered canopies. Hardwood trees are often an important mid-layer component. Conifers, with the exception of cedars, create more acidic soils through litterfall than hardwoods. The evapotranspiration associated with the numerous large trees is high. Air temperatures are cool and diurnal fluctuations are moderated throughout the year. These riparian ecosystems maintain important microclimates.

The stands are generally very stable. Tanoak seldom reaches climax condition due to the time-span required for this succession and the longevity of dominant conifers (200 to 300 years). Fire does not start or carry well in most of these stands. Light disturbance from windthrow, land movement, wind or snow damage leads to continual recruitment of conifers. In the event of large-scale disturbances these riparian stands are slow to recover to a mature state. Where Port-Orford-cedar is present in the riparian zone, roads and streams are important conduits for *Phytophthora lateralis* (Port-Orford-cedar root disease).

Conifer stands often have a higher percentage of perennial streams than other vegetation types. Root strength and often-dense undergrowth contribute to generally stable stream banks. However, riparian conifer stands can develop on earthflows, and exhibit features of deep-seated instability. Earthflows can be important sources of structure for stream channels by providing boulders and large wood. Throughout conifer riparian areas, large wood in the form of limbs and boles is continuously delivered to and incorporated into the channels. Stream temperatures tend to be cool throughout the year. Tall trees can shade even moderately wide channels in summer.

Where coniferous riparian areas are surrounded by similar upland stands, they are important water sources for interior habitat-dependent wildlife. When they are dissimilar to the surrounding upland habitat, they are important uphill-downhill dispersal corridors for interior species. Stable air temperatures make them valuable thermal refugia in extreme weather for many wildlife species. These riparian stands can be important habitat for spotted owls.

Conifer riparian areas can have a moist microclimate and be important to organisms requiring cold, wet environments. For example, Pacific giant salamanders utilize headwater streams to lay their eggs (Stebbins, 1966), and talus habitat in these moist areas can be important for Del Norte salamanders. Meadow and hardwood riparian areas usually receive more solar energy and favor species adapted to more sunlight, lower humidity and warmer temperatures.

Riparian stands of red alder are generally an early to mid-seral stage of the riparian conifer forest. These stands were usually created by stand replacement events such as timber harvest, debris flows, inner gorge landslides, and floods. In some areas red alder is an important component of a mature conifer riparian ecosystem. These alder stands can be important habitat for white-footed voles, and alder leaves are a good source of nutrients for the aquatic ecosystem.

Because of its abundance and high value wood production, more land use activities have occurred in conifer riparian stands than in any of the other riparian types. Therefore, conifer riparian stands are most likely to be candidates for restoration.

### Hardwood Forest Riparian

Hardwood-forested riparian stands tend to replace conifer-forested riparian stands where water is limiting or where a regime of either frequent low intensity or high intensity fires has disturbed the riparian zone. Hardwood riparian stands are usually dominated by tanoak trees, with madrone, myrtle, chinquapin, knobcone and sugar pines often present. Scattered conifers such as Douglas-fir will grow directly out of the stream channel, where there is more water, but they are anomalies in these stands.

Although the canopy is closed, the single-storied structure does not have the insulating qualities of the conifer forest. Humidity is much lower and air temperatures vary a great deal with the seasons. The microclimate differs little from surrounding upland. Fire will both start and carry well in the riparian stands. These stands have low resistance to change from fire and wind and snow damage. Yet their closed canopy, single-storied structure is quick to regenerate. Ground cover is usually low, leading to more surface erosion than conifer riparian stands, but their characteristic stump sprouting after disturbance leads to consistent bank stability.

Hardwood riparian stands are generally similar to their upland surroundings, making them valuable watering sites for local wildlife. They are less important for thermal cover and migration corridors than coniferous riparian stands. Their acorn crop makes them important foraging areas for mast-dependent wildlife.

The economic value of the hardwoods is much lower than conifers, so far less timber harvest has occurred in these riparian areas. As a result, restoration opportunities in this riparian type are few.

### Meadow Riparian

The majority of meadow riparian areas are open canopy areas. As a result, these types of riparian areas receive high amounts of solar radiation; have high diurnal temperature fluctuations, little microclimate differences, and a narrow range of influence beyond the active channel. Fire will start and carry very rapidly through meadow riparian areas. They are dependent upon frequent fire for maintaining their open canopy characteristics.

Light vegetative covering makes easily destabilized banks prone to downcutting and headwall erosion following disturbance. Water temperatures show a strong diurnal fluctuation, similar to air temperatures. On-site diversity in these areas is low, yet may include highly specialized or unique species. Downstream aquatic diversity is increased because of the different types of production occurring at these sites.

Riparian areas bordering meadows provide important water sites for meadow-dependent wildlife species. Their location along the edge of the forest/meadow ecotone increases the on-site diversity of terrestrial species. The meadow riparian areas provide connection corridors for meadow-dependent species.

### Ultramafic Riparian

At these sites high levels of magnesium relative to calcium, high levels of nickel and chromium, and low levels of available soil water limit plant species to those tolerant of these conditions. These specialized communities contribute to the overall biological diversity of the watershed.

Most stands have an open to moderately closed canopy (20 to 70 percent). Understory vegetation cover varies from open to dense. The typically unstable slopes of ultramafic derived soils create high disturbance frequency, contributing to the sparseness of the canopy. Because of the more open canopy, seasonal and diurnal temperatures fluctuate more than in other riparian stands. However, ultramafic riparian stands provide a cooler, contrasting microclimate to the harsh upland ultramafic areas often dominated by open Jeffrey pine stands.

Port-Orford-cedar is often the primary overstory component in riparian areas. Port-Orford-cedar grows slowly on these sites, generally reaching 30 inches in diameter in 400 years on seasonal streams and 30 inches in 200 to 300 years in perennial wet sites. It will remain standing long after it dies. While Port-Orford-cedar has a slow decomposition rate, the sparse vegetative cover on ultramafics creates a low fuel load. This, in turn, results in low intensity fires when fire occurs.

*Phytophthora lateralis* is an introduced pathogen that kills Port-Orford-cedar, reducing shade and concentrating the delivery of large wood. Mortality rates in well-established disease sites are generally higher in the flat, wet sites and lower on steeper stream sections where spores cannot catch on to roots as easily. The rate at which Port-Orford-cedar dies from the introduced root disease could likely cause the population size to fall outside the range of natural variability.

Ultramafic rocks weather to produce landforms with unique topography and hydrology, often prone to mass wasting and erosion in areas with heavy precipitation. The highly sheared structure and low water permeability of the ultramafic rocks result in frequent springs and bogs, flashy flows, inner gorge landslides, and highly erodible stream channels which are sensitive to ground disturbance. The interaction of stream flow with large boulders and resistant outcrops can result in diverse channel morphology. Because ultramafic riparian areas have fewer trees than conifer or hardwood riparian, there is less large wood providing structure in the stream channel. However, when large Port-Orford-cedar is delivered to the channel, it decomposes slowly and functions as structure for a longer period of time than a similar piece of Douglas-fir. Because of the open canopy, stream temperatures are usually much warmer than in streams bordered by dense conifer or hardwood forest. The soil chemistry results in naturally higher pH water than in streams that flow through other soil types.

Although plant diversity is high, terrestrial vertebrate diversity and abundance is low. This is a result of the low thermal cover and low availability of forage. Most use by terrestrial vertebrates is seasonal. Riparian areas are important both as water sources and as travel corridors.

Restoration and enhancement attempts in sparsely vegetated ultramafic areas have had limited success. Development of disease-resistant Port-Orford-cedar and five-needle pine species could improve the success of revegetation in disturbed ultramafic riparian areas.

### *What is the present vegetative condition of Riparian Reserves in the watershed?*

Vegetation within the 300 to 600 foot wide zone of consideration specified by the Northwest Forest Plan (ROD, 1994) includes the sizes and species found throughout the watershed (see Map 12, Riparian Reserves, and page 45, Vegetative Characterization). These species and ages have been affected by both natural processes and human activities. In Table 8 below, the percent Mature and Old Growth is calculated from satellite imagery (PMR vegetation data), interpreted and mapped in GIS and grouped the same as for wildlife habitat analysis in the Terrestrial section of this document. The percent harvested is calculated from managed stands (previously harvested areas) mapped in GIS. Comparing these two columns gives an indication of the degree to which harvest activities have directly affected the riparian condition. Indirect effects from timber harvest and road construction can include channel widening resulting from increases in peak flow or sediment delivery."

**Table 8. Riparian Condition (National Forest lands)**

| Subwatershed | Name | Percent Mature and Old Growth | Percent Harvested |
|---|---|---|---|
| 19F01W | Jim Hunt | 36 | 7 |
| 19F02W | Kimball | 46 | 14 |
| 19F03F | | 32 | 1 |
| 19F04F | | 34 | 9 |
| 19Q | Quosatana | 36 | 18 |
| 21L01F | | 23 | 6 |
| 21L02W | Silver | 11 | 37 |
| 21L03W | Bradford | 42 | 35 |
| 21L04W | Bill Moore | 61 | 4 |
| 21L05W | Wakeup Rilea | 35 | 40 |
| 21L06W | | 30 | 23 |
| 21L07W | Tom East | 31 | 16 |
| 21U01W | Nail Keg | 56 | 24 |
| 21U02F | | 43 | 15 |
| 21U03W | Bridge | 27 | 17 |
| 21U04W | Stonehouse | 42 | 2 |
| 21U05W | Painted Rock | 44 | 11 |
| 21U06F | | 24 | 10 |
| 21U07W | Tom Fry | 41 | 20 |
| 21U08W | Rilea | 43 | 0 |

*Note: Percentages are calculated by dividing the acres of mature and old growth (or acres of managed stands) on National Forest lands within the riparian zone of the subwatershed by the total acres of National Forest land within the same riparian zone.*

Some of these subwatersheds had as much as 40 percent of their riparian areas harvested. Most of this harvest was more than 20 years ago, and some riparian areas are now well shaded by hardwoods and small conifers. Individual assessment of stream channels would be needed to determine the current shade condition. Some discussion of historic vegetative condition is included with channel morphology, pages 25-29.

*Information Needs:* There is a need to conduct site-specific analysis and surveys to support management activities within Riparian Reserves, as described in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI, 1994). There is a need to determine whether previous riparian buffers were effective in protecting riparian processes.

***Management Opportunities:*** There is an opportunity to implement management activities within Riparian Reserves that preserve the critical riparian processes and meet the objectives of the Aquatic Conservation Strategy; and to restore riparian processes where they are not properly functioning.

Specifically:

Fire suppression policies have allowed conifers to encroach on meadows altering riparian function. Riparian ecosystem processes that have been described above should be maintained during restoration efforts.

Riparian thinning and/or planting in existing managed stands are possible management opportunities. Silvicultural practices should be used in these riparian areas to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

# TERRESTRIAL ECOSYSTEM NARRATIVE

## Vegetative Characterization

The watershed of the Rogue River below Agness extends inland approximately nineteen air miles from the Pacific Ocean. The area analyzed for this watershed analysis is primarily the National Forest portion, which stretches from five to nineteen air miles inland. Because of this location, most of the analysis area is strongly influenced by the coastal climate. However, there are a variety of habitats in the watershed driven by diverse physiographic conditions. Vegetative types in the Rogue watershed vary because of the following factors: (1) the diversity of rock and soil types within the Klamath Province, including ultramafics; (2) the location of the watershed in a transition zone between the coastal face and the drier, inland Siskiyou habitats; and (3) the locally wide variation in aspect and elevation.

At least six plant series occur within the watershed analysis area on National Forest lands: tanoak/Douglas-fir, Douglas-fir, tanoak, western hemlock, Port-Orford-cedar, and Ponderosa pine. Tanoak/Douglas-fir and Douglas-fir plant series account for over 90 percent of the entire watershed analysis area. The tanoak series generally occurs below 4000 feet and west of the coastal crest where the marine influence is high. Tanoak is an indicator of deep fertile soils or low atmospheric moisture demand (USDI & USFS, 1995). Douglas-fir and western hemlock are co-climax with tanoak on the drier and wetter sites, respectively (Atzet et al., 1996).

Ultramafic (serpentine) soils scattered throughout the Rogue watershed analysis area support a wide variety of other conifers, including Jeffrey pine, western white pine, and incense cedar on the drier slopes, and Port-Orford-cedar on more moist sites.

The entire area within the boundaries of the analysis area is generally timbered with saplings, young, mature and old growth Douglas-fir. Low elevation old growth Douglas-fir is fairly abundant in this watershed compared to other areas in the State. The Shrader Old Growth Trail provides an excellent example and interpretation of this type of old growth forest.

**Table 9. Vegetation Types and Percent of Analysis Area.**

| Vegetation types | Acres | Percent of Analysis Area |
|---|---|---|
| Water | 1,181 | 1 |
| Rock | 1,260 | 1 |
| Grass * | 7,455 | 9 |
| Seedlings/saplings/poles | 22,138 | 27 |
| Young timber | 27,032 | 33 |
| Mature timber | 13,819 | 17 |
| Old growth timber | 9,857 | 12 |

* *Grass vegetation type is composed of grass vegetation within the Forest Boundary and grass plus seedling vegetation outside the Forest Boundary.*

Hardwoods and moderate to high amounts of brush are found in the understory of most old growth Douglas-fir stands. Hardwood species found are tanoak, red alder, and Oregon myrtle. The largest patches of mature and old growth trees are located in the Quosatana and Bradford Creek drainages, and within one half mile of the Rogue River. Younger stands are found on private ground within National Forest boundaries and Forest Service managed lands where seedlings, saplings and pole sized trees are prevalent. In many portions of the drainage at mid and upper elevations, stands of mid-seral Douglas-fir appear to have been heavily influenced by past fires.

Unique Interest and Botanical areas help characterize the diversity of vegetation within the analysis area. Portions of the Quosatana Butte and Signal Butte Unique Interest Management Areas as well as the Lobster Grove Botanical Area are included in this Rogue River Watershed Analysis Area.

Approximately 463 acres of the Lobster Grove Botanical Area lies within the Lower Rogue River watershed, the remaining 71 acres of the botanical area are in the Lobster Creek watershed. The value of the site lies not with rare plants, but with its old growth plant community. This is an area of very large Douglas-fir and Port-Orford-cedar; some individual trees approach 8 feet in diameter. The site is dominated by 10 to 15 large trees per acre, the heavily shaded understory is composed of sword fern, tanoak, madrone and Oregon-myrtle. The world's largest myrtle tree is located within the grove (USDA, 1989).

### Private Land Within the National Forest Boundary

Inside the National Forest boundary there are considerable private land holdings. The old growth on these lands was heavily harvested during the 1950s and 60s, and the lands now support either mixed stands of sapling and pole sized conifer and hardwood trees, or have been left as grasslands for pasture. Some residential development has taken place along the Rogue River, generally within one half mile of the waterline.

### Timber Harvesting History on National Forest Lands

On the National Forest lands, timber has been harvested from over 9,000 acres since the early 1950s, removing mostly old growth timber until recent years when emphasis has shifted to commercial thinning of large poles and mature timber. Most heavily harvested areas have been in the west side of the Quosatana Creek watershed along the 090 and 100 road systems, along the eastern side of the same watershed in the upper stretches along Wildhorse Ridge, and from the north side of the Wakeup Rilea Creek drainage northeast into the Nail Keg Creek area. Additional scattered harvest has taken place on the north side of the Rogue River in the upper reaches of Tom East, Bridge, Stonehouse, and Sundown Creek drainages (see Map 21, Regeneration Harvest and Roads).

## Wildlife Habitat Characterization

The Rogue River watershed below Agness contains 19 percent of the larger Northwest Coast Late-Successional Reserve (LSR). This watershed analysis area is within the known range of the marbled murrelet. The late-successional habitat in the watershed provides important habitat for the American marten, pileated woodpecker and the threatened northern spotted owl, which are indicator species, meaning they represent other species that use similar habitat types. This version of the Rogue River Watershed Analysis Below Agness was analyzed using Pacific Meridian Resources (PMR) vegetation data for areas within the National Forest boundary and Western Oregon Digital Imagery Project (WODIP) vegetation data for areas outside the National Forest Boundary.

Early successional habitat (grass/shrub/seedling-sapling-pole) in the watershed is found in recent clearcut areas, meadows, pastures, open woodland areas and brushfield areas. Currently 36 percent (29,593 acres) of the watershed is in this condition. However, only a portion of this early successional habitat is in an open canopy condition, which will provide the pioneer habitat for species that require grass/forb, low shrub, open seedling-sapling-pole habitat for all or part of their life history. The majority of the existing clearcut areas that are currently open enough to provide this type of habitat will grow out of this condition within the next ten years. The meadow habitat is being encroached by trees. Pioneer successional habitat provides habitat for black-tailed deer, Roosevelt elk and other species that utilize grass/forb, shrub and open sapling-pole plant communities.

This watershed contains an estimated 1 percent or 1181 acres of water, and 1 percent or 1260 acres of rocky/sparsely vegetated areas. The remaining 33 percent of the watershed is in young successional habitats, which typically are smaller diameter trees with closed canopy.

## Late-Successional Habitat

### *What is the historic and existing late-successional habitat in the watershed?*

Historic levels of late-successional forest (pre-1850 to 1950) have fluctuated over time due to climatic changes and human influence (Atzet and Martin, 1991). The Regional Ecosystem Assessment Report (USDA, 1993) estimated historic levels of late-successional habitat between 45 and 75 percent for the Lower Rogue Basin. This portion of the Rogue Watershed (below Agness) is below this range.

Approximately 29 percent of the portion of the Rogue River, below Agness, watershed is presently in late-successional forest (see Map 14, 1995 Seral Stages). Historical vegetation mapping shows 67 percent of the Rogue River Watershed Below Agness provided late-successional habitat in the 1940s, prior to any timber harvest (see Map 13, 1940 Seral Stages). Burning by Native Americans and early Euro-American settlers probably reduced what could have been late-successional habitat in 1940 to lower levels. The exact percentage or level cannot be determined.

Late-successional forests are one facet of overall biological diversity. However, late-successional forests require special consideration because their integrity as functioning ecosystems and their ability to provide habitat to species associated with the forest interior may be strongly influenced by stand size (Rosenburg and Raphael, 1986). Logging in the Pacific Northwest has reduced the size of late-successional forests, resulting in regionwide changes in wildlife species composition (Rosenberg and Raphael, 1986). On the Siskiyou National Forest much of the timber harvested has been on productive lower elevation sites. The amount of late-successional habitat on the Forest has been reduced nearly 26 percent since 1940 (USDA, 1989, Forest Plan FEIS, Chapter III-Affected Environment, page III-115).

Stands of late-successional forests are becoming isolated as harvest, fire and other activities disrupt connections between large, contiguous blocks of this habitat. This fragmentation threatens the ecological value of the remaining late-successional forests, including their value as habitat for forest interior plants and animals. The full impact of fragmentation of late-successional forests is not completely understood, but the populations and numbers of species associated with mature and late-successional forests can decrease if fragmentation, isolation, and reduction in stand size continues.

Interior forest habitat includes those portions of the late-successional forest areas that are not influenced by "edge effect." Edge effect is the result of changes in microclimate and species composition, which are caused by an increased exposure to sun and wind. Edge effect penetrates a forest edge for approximately two tree lengths or about 400 feet into the forest interior, which is a guideline for the Pacific Northwest (Harris, 1984; Franklin and Forman, 1987). The preliminary results of current research (Spies et al., 1990) generally support this approximate distance.

Interior late-successional habitat was analyzed using GIS seral stages from stand level data. Interior habitat was determined by buffering in from openings in the forest. Buffering distances used were 400 feet from clearcuts or natural openings less than 40 years old. Because stands on ultramafic soils are largely open, and do not contain the same microclimates typical of closed canopy late-successional stands, these stands were not included as interior late-successional habitat A 400-foot buffer from these stands was not applied. Some of these stands may provide typical microclimates associated with closed canopies, but an analysis of each stand was not feasible. See Maps 15, 16, and 17: 1940, 1995, and 2040 Interior Late-Successional Habitat.

**Table 10. Distribution of Interior Late-Successional Forest Blocks within the Rogue River, below Agness, watershed.**

| | Historic (1940) | | Current Condition | | Future (2040) | |
|---|---|---|---|---|---|---|
| Block Size in Acres | Number of Blocks | Total Acres | Number of Blocks | Total Acres | Number of Blocks | Total Acres |
| 1-25 | 25 | 173 | 84 | 544 | 87 | 560 |
| 26-50 | 8 | 310 | 12 | 422 | 10 | 351 |
| 51-100 | 3 | 236 | 5 | 316 | 9 | 585 |
| 101-300 | 7 | 1,431 | 6 | 1,195 | 12 | 2.219 |
| 301-500 | 0 | 0 | 2 | 802 | 0 | 0 |
| 501-700 | 2 | 1,190 | 1 | 641 | 1 | 501 |
| 701-900 | 3 | 2,371 | 0 | 0 | 3 | 2,486 |
| >900 | 5 | 31,031 | 1 | 1,370 | 1 | 1.627 |
| **Total Interior Acres** | | **36,742*** | | **5,290*** | | **8,329*** |

* Historic interior old growth acres are based on broad scale timber typing from 1940 aerial photos. Current condition interior old growth acres are based on analysis of 30-meter pixel data from satellite imagery (PMR data). The difference in detail between the two sources accounts for some of the difference in interior old growth acres between these two dates. Increases in future interior old growth acres are based on projected growth of large stands of young conifers in the watershed. These stands originated during extensive stand replacement fires prior to the era of fire suppression that began in the early 1900s.

The National Forest Management Act (36 CFR 219.19) requires the maintenance of viable populations of vertebrate species well distributed throughout their current geographic range. Late-Successional Reserves have been designated to accomplish this direction for species that use this habitat type (USDA and USDI, 1994). Thirty-four percent of the watershed has been designated Late-Successional Reserve and another 12 percent of the watershed will be managed towards a late-successional habitat condition through other land allocations. Forty-six percent of the watershed is in private ownership.

The above tables show that there are currently lesser amounts of late-successional habitat in the Rogue River Watershed, below Agness, than there were in 1940. Future projections indicate that the amount of late-successional habitat is expected to increase on federal lands, but remain low on private lands. This increase in late-successional habitat is consistent with the ROD (USDA and USDI, 1994, for federal lands.

The ROD (USDA and USDI, 1994) further indicates that thinning or other silvicultural treatments may occur inside these Late-Successional Reserves if the treatments are beneficial to the creation and maintenance of late-successional forest conditions.

***Management Opportunities:*** Development of late-successional structure can be accelerated through treatment of managed and natural stands in LSR and other allocations not programmed for timber harvest. Approximately 9,650 acres of managed stands in the watershed could be treated to improve habitat for the northern spotted owl and other species that use late-successional habitat. The opportunity exists to prioritize which of these stands would benefit late-successional species the most (i.e. stands within home range of owls or within potential habitat connections).

The highest priority for commercial stand treatment to improve late-successional habitat are those stands that have mid-seral habitat adjacent to existing large late-successional habitat blocks (see Map 14, 1995 Seral Stages). Treatment in these stands would result in the achievement of late-successional characteristics at an earlier time than if allowed to progress at a natural rate.

### Bear Damage

During the analysis of the watershed it was discovered that bear damage is occurring in much of the area south of the Rogue River. For the last 3 to 4 years bears have been stripping and peeling bark from conifer trees in plantations with advanced reproduction. Dominant and co-dominant conifers between 10 to 16 inches diameter are generally the damaged trees. Typically, a bear will sit on the ground and scoot around the bole, peeling and eating the inner bark of trees within the plantation, or in the case of younger bears, may climb the trees and peel off bark at some point above ground level. There is evidence that this is learned behavior passed on from sow to cubs. There is also some indication that fertilized plantations are among those hardest and most frequently hit by the bears.

Low elevation aerial photographs were flown in September of 1999. These special flight color photos show trees girdled in the spring of 1998. Dead conifers from the spring of 1997 are also evident by close analysis of the aerial photos. Approximately 1300 to 1700 acres in the Lower Rogue watershed analysis area have received moderate to heavy damage in the last 3 to 4 years (see Map 22, Bear Damage). Some plantations, including the Baxter Progeny Test Site, are experiencing up to 100 percent tree losses due to bears. Other plantations have received less damage, with the average being 60 percent. However, with no bear control measures in place at present, bear populations are probably expanding with corresponding tree damage area expansion. Without some control over the bear populations and damage, the development of late-successional habitat is being moderately to severely inhibited on approximately 1,700 acres within the watershed analysis area.

***Management Opportunities:*** A Bear Damage Abatement Plan needs to be developed in collaboration with the Oregon Fish and Wildlife Service providing a damage risk assessment and reasonable control of bear populations.

## Special and Unique Habitats

### *What are the special and unique habitats in the watershed and how are they changing?*

The Siskiyou National Forest Plan designated 463 acres of Botanical areas (Management Area 4) within the Rogue River watershed below Agness. This includes a portion of the Lobster Grove Botanical Area. Appendix F of the Siskiyou LRMP EIS (USDA, 1989) provides a description of this Botanical Area on pages 138-139.

During the past ten years a number of important but relatively small Special Wildlife Sites (Management Area 9) on the Forest have been identified as unique wildlife habitats and small botanical sites (Siskiyou LRMP, USDA 1989, page IV-113). A total of 4249 acres have been designated in the Rogue River, below Agness, Watershed (see Map 18, Special Wildlife Sites). These sites constitute important components of overall wildlife habitat diversity and botanical values within the watershed.

**Table 11. Special Habitat Sites (Management Area 9)**

| Type of Site | Number of Sites | Acres |
|---|---|---|
| Dispersed Late-Successional | 11 | 395 |
| Lakes and Ponds | 6 | 30 |
| Meadows and Meadow Buffers | 44 | 2,041 |
| Rock Bluffs/Talus | 22 | 230 |
| Wildlife Areas | 11 | 1553 |
| **Total** | | **4249** |

## Meadows, Open White/Black Oak Savannas and Open Jeffrey Pine Meadows

Meadows, sometimes referred to locally as prairies, are decreasing in size. Historically Native Americans maintained meadows and open oak savannas by augmenting natural wildfires with burning, and early settlers reduced conifer encroachment rates on these open areas with heavy grazing and/or burning. Natural fires may have also opened many ridgetop environments to meadow, or meadow-like conditions. Early encroachment of meadow habitat is evident on the 1940 aerial photos. The encroachment visible on the 1940 photos around Potato Patch meadow was determined to be 20 years old when the photo was taken. Currently this encroachment is 80 years old. Meadows and open oak savannas have increasingly become overgrown with conifer tree species, primarily Douglas-fir, since 1920. Meadows and open oak savannas are projected to continue to decrease in size due to vegetative encroachment and lack of high intensity fire events, unless encroachment is reduced through manual methods (girdling and cutting trees) and through burning.

Oregon white oak, *Quercus garryana*, and California black oak, *Quercus kellogii*, are found only in a few locations in the Rogue River, below Agness, Watershed where they are associated with meadow communities (Meadows #280, 606, 66, 613 & 614). These oaks are valuable for their function in providing landscape diversity. Several components of oak woodlands are especially valuable to wildlife, including mast-producing trees, cavity trees, and perches. They often occur as ecotones - interfaces between coniferous forests and prairies or other habitat (Ryan and Carey, 1995).

Open oak savanna communities often depend on fires for their maintenance. In the absence of fire, many Oregon white oak stands are invaded and eventually overtopped by Douglas-fir. Without disturbance, black oak is eventually crowded out of the best sites and remains only as scattered remnants in mixed-conifer forests (Burns and Honkala, 1990). The savannas within the watershed are decreasing in size, as apparent from historical photos, from anecdotal reports by long-time residents, and from field examination of young Douglas-fir stands that are overtopping remnant oaks. This is part of a trend throughout the California to British Columbia range of the white oak, and the California to Oregon range of the black oak (Burns and Honkala, 1990; Niemic et al, 1995; Ryan and Carey, 1995).

The Pebble Hill and Pine Grove Meadow complexes are examples of large open Jeffrey Pine trees with a grass ground cover. However, this open pine/grass habitat is being lost to encroaching Douglas fir, incense cedar, and numerous small pine seedlings.

The Southwest Oregon LSR Assessment (USDI and USDA, 1995, page 143) identified meadow and oak savanna habitat within the Late-Successional Reserves as important elements of habitat diversity. "Maintenance of these areas ensures this habitat continues to function and provide biological diversity. Though the maintenance of this habitat is contrary to late-successional conditions, the limited area, arrangement, and importance of this habitat niche does not adversely impact the objectives of the late-successional reserves, and does improve ecosystem resilience by increasing diversity".

### Other Special Wildlife Sites

Existing lakes, ponds, springs, talus areas, and rock outcrops with associated caves and cliffs are not expected to have changed very much from historic (1940) conditions. Wildlife associated with these habitats include red-legged frog, southern torrent salamander and western toad (lakes, ponds, springs), Del Norte salamander (talus habitat), peregrine falcon, common raven, golden eagle, cliff swallow (cliff habitat), western fence lizard, sagebrush lizard, ringtail, porcupine, marten (rock outcrops), bats, bear, bobcat, cougar, and woodrat (cave habitat). Rock quarry development has slightly reduced the amount of talus and rock outcrop habitat in the watershed.

***Information Needs:*** Inventories of the meadows and oak savanna areas need to be completed to determine species composition, amount of encroachment, the best methods to restore the meadow/savanna habitat, and the best methods to improve or restore native grasses and other species. Potential special and unique sites need to be surveyed to determine if they meet Management Area 9 (Special Wildlife Site) criteria.

***Management Opportunities:*** There is an opportunity to return meadows, oak savannas and pine savannas to historic conditions on National Forest lands. Some specific projects on National Forest land include: Adams Prairie, Skookumhouse Prairie, Potato Patch Meadow, Woodruff Meadow and Pine Grove Meadow. There is an opportunity to reduce and eventually eliminate noxious weed invader species such as Scotch broom, Canada thistle, meadow knapweed and tansy ragwort.

## Proposed endangered, threatened and sensitive (PETS) species

***What is the relative abundance and distribution of the species of concern in the watershed (e.g., threatened or endangered species, special status species, species emphasized in other plans)? What is the distribution and character of their habitats?***

The Siskiyou National Forest has three species listed as *endangered* or *threatened* under the Endangered Species Act: the (1) bald eagle, (2) northern spotted owl, and (3) marbled murrelet. Bald eagles, which are classified as threatened, are known to nest near the Rogue River within this watershed analysis area. Marbled murrelets, also classified as threatened, are known to nest in this watershed analysis area. The Rogue River (below Agness) watershed contains 10 northern spotted owl activity centers and a portion of the median home range (1.3 mile radius around a nest or activity center) of an additional 6 spotted owl pairs.

Peregrine falcons were removed from the list of Endangered and Threatened wildlife on August 25, 1999 (USDI, 1999). They were subsequently listed as a sensitive species by the Forest Service (USDA, 1999). There is one known nest of peregrine falcons in the watershed, out of only six on the Siskiyou National Forest.

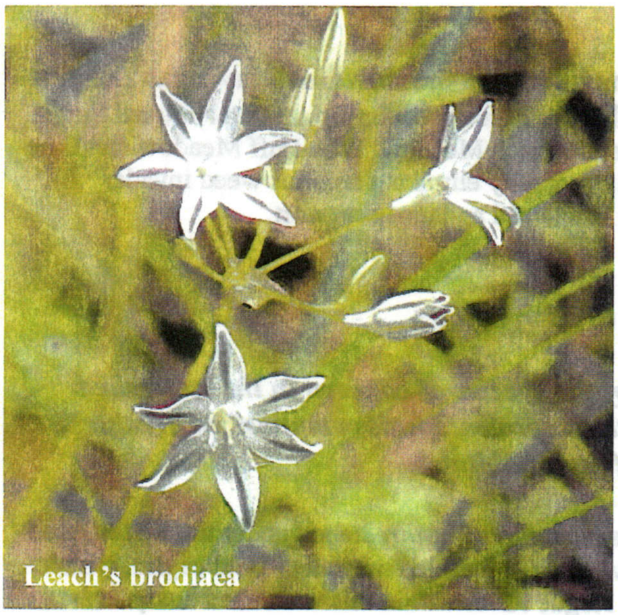
The late-successional habitat in Rogue River watershed, below Agness, contains the activity centers of the 9 owl pairs in the watershed. Five activity centers are located in Late-Successional Reserve (Management Area 8) and four activity centers are located in Supplemental Resources (Management Area 7). The viability of owls within the watershed should remain stable. See indicator species section below.

This watershed will continue to contribute to the viability of bald eagles and peregrine falcons.

**Sensitive Species**

**Plants:** The watershed has numerous occurrences of several sensitive plant species. *Arctostaphylos hispidula* (Howell's manzanita), *Carex gigas* (Siskiyou sedge), *Erigeron cervinus* (Siskiyou Daisy), *Illiamna latibracteata* (California globemallow), *Monardella purpurea* (Siskiyou monardella, *Salix delnortensis* (Del Norte Willow), *Triteleia hendersonii* variety *leachiae* (Leach's Brodiaea) and *Trillium kurybayashii* (Kurybayash's Trillium).

Also occurring in the watershed are: *Allium bolanderi* (Bolander's Onion) and *Poa piperi* (Piper's Bluegrass). These two species were removed from the Sensitive Species list in May 1999 and are still on the Oregon Natural Heritage Program List 4 (taxa which are of conservation concern but are not currently threatened or endangered). A third member of this list within the watershed is *Arabis aculeolata* (Waldo Rockcress). Another species, *Downingia yini* (Dwarf Downingia), although not on any special status lists, occurs as an isolated population in the watershed.


Leach's brodiaea

The watershed is particularly important for Siskiyou Daisy and Leach's brodiaea. Siskiyou daisy is restricted to the Siskiyou Mountains of Oregon and California. This watershed, the northwestern extent of the species range, contains two populations. These daisies live in crevices in solid rock, or in rocky areas. Leach's brodiaea, although locally common to the east of this watershed, has a very limited range with the bulk of the world's population on the Gold Beach Ranger District. The Species Management Guide for *Triteleia hendersonii* var. *leachiae* (Titus, 1995) lists the 10 most significant populations. One of these populations, adjacent to the 3318300 road, is in this watershed. It occurs on the edge of old growth forest at the southwest edge of the range of Leach's brodiaea. The species management guide lists fire suppression and related successional events, logging, and road construction as important threats to the species. It also lists meadow management as critical for the continued survival of this taxon. The guide states the species is expected to be very fire hardy.

Waldo rockcress occurs on rocky peridotite and serpentine soils (Greenleaf, 1979). It is found on the western side of the Illinois Valley in Josephine County and one isolated site on serpentine soils in this watershed. It occurs on the southern side of Copper Canyon. Because this plant is listed with the Oregon Natural Heritage Program and is known from only one population on the west side of the Siskiyou National Forest, it should be protected from future management activities (Maria Ulloa personal communication).

Dwarf Downingia occurs in boggy sites near ponds and lakes in the Klamath and Cascade Ranges (Hickman, 1993). This watershed has one location of this species near the Lower Rogue River Trailhead. The plant was originally collected there approximately 40 years ago, and collected again recently (Veva Stansell, personal communication). It is the only known Curry County site for this species.

**Amphibians, Mammals and Reptiles:** Del Norte salamanders (73 sites), Red-legged Frogs (38 sites), Townsend's big-eared bats (2 sites), Northwestern pond turtles (5 sites), and California mountain kingsnakes (7 sites) are documented in the watershed. Riparian areas in the watershed provide potential habitat for white-footed voles. Wolverine have not been sighted in the area and none have been detected on snow track surveys. Common kingsnakes have not been found in the watershed area.

**Neotropical Migratory Birds:** The few large, relatively unfragmented blocks of habitat remaining within the watershed provide good nesting sites for birds, such as the willow flycatcher, pacific-slope flycatcher and hermit warbler. These birds are vulnerable to parasitism by brown-headed cowbirds. Cowbirds, edge specialists, are particularly attracted to human habitation and cattle, both of which are present in Agness at the upper end of this watershed. This site acts as a reservoir for brown-headed cowbirds. Current numbers of cowbirds have been as high as 40 birds at Agness. The species is not commonly sighted in the watershed outside of Agness.

Willow flycatchers, a species of special concern, nest along the river corridor. They are known only in the riparian areas of the Rogue River and Chetco River on the west side of the Siskiyou National Forest.

Another species of special concern, Vaux's swift, nests in large, hollow dead trees or structures that provide similar habitat such as chimneys. Large hollow trees are uncommon, and rarely found except in old-growth forests. They are frequently seen foraging over the Rogue River in this watershed. They nest as single pairs, or often in small groups. When in migration, they form large congregations and sometimes over 100 birds roost in single sites. Two large migratory roosts are known in the lower portion of this watershed at Jerry's Flat and it is likely that some large roosts also occur in the National Forest portion of the watershed as Vaux's swifts are frequently seen.

## Indicator Species

Seven forest wildlife species, and one group, have been selected as management indicator species. An indicator species represents all other wildlife that utilizes the same habitat type. Indicator species act as barometers for the health of various habitats (Siskiyou LRMP IV-10, USDA, 1989).

### Bald Eagle and Osprey

Bald eagle and osprey utilize habitat corridors along major rivers, sometimes nesting up to one mile (occasionally further) from rivers in large green trees or dead trees. The Lower Rogue River watershed is important to the viability of bald eagles and osprey. Bald eagles are known to nest here and are regularly seen foraging along the Rogue River within the analysis area.

Osprey nests have been closely monitored from 1992 to 1999 (1992 to 1996 data published in Blithe and Dillingham 1997; 1997 to 1999 data unpublished). Nest trees fall down, nests blow out of trees, and osprey seem to regularly build new nests in different parts of the river However, during the eight years of monitoring, there has been a stable population of thirteen pairs nesting along the Rogue River from Agness to Lobster Creek. The stable population in this vicinity contrasts with the area from Lobster Creek to the Rogue River mouth where the population has approximately doubled in the same eight-year monitoring period. If we use older survey data (Lee Webb unpublished data) we see the population has indeed increased from the eight pair found in 1976 between Agness and Lobster Creek. Six of the nest trees used during the 1992 nesting season were still active during the 1999 nesting season. Of the thirteen active nests in 1999 (see Map 23, Osprey Sites), nests had been present in the same tree an average of five years. The Siskiyou LMRP (USDA, 1989) has Standards and Guidelines (4-4 and 4-9) for maintaining potential nesting habitat.

### Spotted Owl, Pileated Woodpecker, and American (Pine) Marten

The northern spotted owl represents over 150 other wildlife species, which use late-successional forest habitat for all or part of their life cycles (Guenther and Kucera, 1978, Brown, 1985). Spotted owls are strongly associated with dense mature and old-growth Douglas-fir forests. These habitats provide the structural characteristics required by the owls for food, cover, nest sites, and protection from weather and predation. Pileated woodpeckers and pine marten represent the composite needs of over 160 wildlife species that utilize mature forest (Guenther and Kucera, 1978, Brown, 1985). The Siskiyou LRMP (USDA, 1989) had designated areas for the pileated woodpecker and pine marten within the Rogue Watershed (Management Area 8, Forest Plan, Chapter IV-Forest Management Direction, page IV-105). However, the ROD (USDA and USDI, 1994) amended MA-8, and created Late-Successional Reserves that account for these species and the species they represent.

Existing sighting data from the Wildlife Observation (WILDOBS) database was analyzed. The geographical information system (GIS) was used to analyze stand level vegetation data to calculate historical, existing, and future levels of habitat for these species (Table 12). Mature and old-growth seral stages were used for pileated woodpecker, marten and spotted owl habitat (see 1940 and 1995 Seral Stages, Maps 13 and 14).

**Table 12. Habitat Trends for Selected Indicator Species**

| | Pileated Woodpecker, Marten and Spotted Owl Habitat | |
|---|---|---|
| **Year** | **Acres** | **Percent Watershed** |
| 1940 | 55,815 | 67 |
| 1993 | 23,677 | 29 |
| 2040 | 28,418 | 34 |

Spotted owls, pileated woodpeckers and marten have been documented in the Rogue River, below Agness, watershed (see PETS section for more details). Future projections indicate that the amount of late-successional habitat available for these indicator species is expected to increase on federal lands, but remain low on private lands.

**Woodpeckers:** The composite snag needs of woodpeckers represent all wildlife species that use cavities for nesting or denning (Siskiyou LRMP FEIS, pages III-104, III-105, USDA, 1989). On the Forest, and most likely in Rogue River, below Agness, watershed, there are over 75 species which use snag habitat (Guenther and Kucera, 1978, Brown, 1985). Siskiyou Forest Standard and Guideline 4-13a states that habitat capability of woodpeckers should be continually maintained at not less than 60 percent of potential population levels in areas managed for timber production.

Woodpeckers are dependent upon snags and down wood for roosting, nesting, and foraging habitat. High intensity fires killed large conifers and hardwoods. The variation in amounts left after fires is not known. There were areas shown on 1940 aerial photos, where large brushfields did not contain visible large snags These were mainly found in areas that likely had frequent fires, i.e placed high up on ridges on south facing slopes. Smaller snags were created in stand development where competition between densely spaced trees and brush caused mortality.

**Deer and Elk:** Elk and deer use all successional stages to meet their habitat needs for cover, forage, and reproduction. Natural or created openings provide the majority of the feeding habitat, which is assumed to be the most restrictive habitat component in this region (Forest Plan FEIS, Chapter III-Affected Environment pages III-106 through III-107). Elk and deer represent more than 180 wildlife species that need young successional stages to meet all or some of their requirements (Guenther and Kucera, 1978 and Brown, 1985).

The Rogue River, below Agness, watershed has large concentration of elk on private land and the adjacent Forest Service lands. A few scattered small elk herds utilize Forest Service lands near Wildhorse Ridge, Frog Lake, Button Prairie and Adams Prairie. The elk mostly use recent clearcuts, meadows and open pine savannas for forage.

Deer are found throughout the watershed, though an accurate estimate of their population is unavailable. Local residents report that populations are far smaller now than they were ten to twenty years ago. Deer use newly harvested areas and natural meadows for foraging. They also feed on acorns from oak trees throughout the area and use the riparian areas during fawning season and summer.

To estimate the amount of deer and elk habitat, the amount and quality of forage and cover was analyzed. GIS was used to analyze seral stages at the stand level. Tables 13 and 14 list the acres of each type of habitat estimated for the Rogue River, below Agness, watershed.

**Table 13. Historic Elk Habitat Type (1940)**

| Habitat Type | Percent of Watershed |
|---|---|
| Optimal/Thermal Cover | 76 |
| Hiding Cover | 7 |
| Forage | 12 |

**Table 14. Current Elk Habitat Type (1995)**

| Habitat Type | Percent of Watershed |
|---|---|
| Optimal/Thermal Cover | 61 |
| Hiding Cover | 16 |
| Forage | 20 |

Existing conditions for elk habitat were evaluated using a model developed for use in Western Oregon. The model was based on the interactions of four variables: (1) size and spacing of forage and cover, (2) road density, (3) cover quality, and (4) forage quality (Wisdom et. al., 1986). Optimal cover modifies ambient climate, allows escape from human harassment, and provides forage. Thermal cover functions similarly to optimal cover, but it does not provide forage. Hiding cover allows elk to escape human disturbances (Wisdom et. al., 1986). The quality of forage is as important as the amount of forage available. Human disturbance allowed by motor vehicle access reduces elk use of habitat adjacent to roads (Wisdom et. al., 1986).

Currently the amount of forage area in the entire Rogue River, below Agness, watershed watershed is within the LRMP 4-11 suggested 20 percent. However, only 13 percent of the area within the National Forest boundary is currently forage. As a requirement under NFMA 219.19, the Siskiyou National Forest, Forest Plan FEIS, p. III-102, designated elk and deer as indicator species in the Siskiyou National Forest, Forest Plan FEIS. Deer and elk were selected because they are commonly hunted and they represent other species that utilize early successional forest. There are more than 180 wildlife species that need young successional stages to meet all or some of their requirements (Brown, 1985). NFMA, 219.19 states, "In order to insure that viable populations will be maintained, habitat must be provided to support, at least a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." Because the percentage of forage acres on National Forest lands are projected to decline, populations of wildlife species that are associated with this habitat type are also projected to decline on National Forest lands.

The area outside the National Forest boundary, which is predominantly private land, currently has 31 percent in foraging habitat.

***Information Needs:*** Pacific Meridian Research (PMR) and Western Oregon Digital Inventory Project 1993 (WODIP) vegetation data needs to be ground verified to ensure validity. The correlation between certain vegetation types, seral stages and wildlife use of those habitats needs to be verified. This can be accomplished by continuing to do surveys for presence of indicator and PETS species.

***Management Opportunities:*** Forage seeding could be used where timber harvest occurs to enhance the forage value for elk. Encroaching trees in open meadows and oak savanna areas can be cut and removed or girdled (See Special Wildlife Site Section). Open meadows and pine savanna areas can be burned to remove encroachment and benefit native species. Areas of exposed soil can be seeded with native species. A potential specific project is to create some quality forage/early successional habitat within immature and mature stands by thinning to a wide spacing, creating 1 to 2 acre openings, underburning, and seeding with native species.

## Exotic and Noxious Weeds

### *What are the locations and risk of spread for noxious weeds in the watershed?*

Large numbers of exotic and noxious weeds have invaded the watershed and are increasing in numbers (see Map 19, Noxious Weed Sites). The species and their status can be found in Table 15. Their aggressive nature threatens to destroy native plant communities. Many colonies have been discovered and destroyed, but many of these sites are still active, because seeds left from mature plants germinate after the site has been treated. New colonies of these species are expected to continue to be found as seed is carried into the watershed from neighboring lands, especially upriver colonies of purple loosestrife and yellow star thistle along the Rogue River corridor. The proximity to high concentrations of loosestrife and yellow star thistle upriver in Josephine and Jackson Counties is one of the reasons why such a high number of weed sites occurs in this watershed.

**Table 15. Weeds of the Lower Rogue River Watershed.**

| Common Name | Scientific Name | Abundance in Watershed | Status* | Native Range |
|---|---|---|---|---|
| Bull Thistle | *Cirsium vulgare* | Widespread | B | |
| Canada Thistle | *Cirsium arvense* | Widespread | B | SE Europe and Asia |
| French Broom | *Cytisus monspessulanus* | * | B | |
| Gorse | *Ulex europaeus* | * | B, T | Europe |
| Meadow Knapweed | *Centaurea pratensis* | 3 upland sites, 3 river sites | B | Europe |
| Poison Hemlock | *Conium maculatum* | 2 sites | B | Eurasia |
| Purple Loosestrife | *Lythrum salicaria* | 1 site | B | Europe |
| Scotch Broom | *Cytisus scoparius* | * | B | Europe |
| St. Johnswort (Klamath Weed) | *Hypericum perforatum* | Widespread | B | Europe |
| Tansy Ragwort | *Senecio jacobaea* | Widespread | B, T | Europe |
| Yellow Starthistle | *Centaurea solstitialis* | * | B, T | Mediterranean Europe |
| English Ivy | *Hedera helix* | 2 sites | | Europe |
| Fennel | *Foeniculum vulgare* | * | | Southern Eurasia |
| Silver Nettle | | 1 site | | |
| Teasel | *Dipsacus sylvestris* | * | | Europe |

- From Oregon Department of Agriculture's Noxious Weed Policy and Classification System (1999). B=Weed of economic importance which is regionally abundant, but which may have limited distribution in some counties. T=priority noxious weed designated by the State Weed Board.

* Found in watershed, sites not inventoried.

Pampas grass and Italian thistle have been found in neighboring watersheds but have not yet been observed in this watershed. Their numbers in neighboring watersheds have not yet been great enough to spread seeds to the watershed. There is a danger that equipment from sites out of the local area could bring seeds to this watershed.

Canada thistle was recognized as a problem in the late 1700s and now infests a large part of Canada and the northern half of the United States (Hawkes et al., 1985). It is probably the most widespread serious problem weed in Oregon, occurring in every county of the state. It is common in the watershed, and is found from the banks of the Rogue River and several plantations and roadsides within the watershed. It is an aggressive plant that spreads by both seeds and roots and is difficult to control due to a deep and extensive root system. Mechanical and hand pulling treatments are ineffective. Chemical control works, but is expensive to implement because of the large number of infestations. The insect *Uropha cardui*, used as a biological control agent, occurs on Road 3313103 in a large patch of Canada thistle. The population of insects has slowly been growing since its introduction in 1996, but it is still too early to determine if this will be an effective control measure here. *Uropha cardui* has been rated only as having "fair" control ability on seeds and plant density elsewhere in Oregon (Coombs, 1999).

Poison hemlock is found in Quosatana Campground and along the Agness Road. The public should be aware that this plant is toxic to humans and livestock alike. Sheep eating as little as 4 to 8 ounces of green leaves or cattle eating 10 to 16 ounces may be fatally poisoned (Hawkes et al., 1985).

Tansy Ragwort

Tansy ragwort, St. Johnswort and bull thistle commonly occur on disturbed sites. Although they have long occupied many of the watershed's disturbed sites they pose a lesser threat to the area because insects keep their populations under control. These insects are also known as biological controls. Tansy flea beetle and the cinnabar moth have been introduced to reduce the number of tansy ragwort plants in the watershed. Monitoring efforts have shown that tansy ragwort populations and insect control are cyclic in nature. Years when there are higher numbers of tansy ragwort, are followed by years when insect populations increase and reduce the ragwort infestation levels.

Silver nettle, also known as archangel, is not designated as a noxious weed by the Oregon Department of Agriculture. It is a cultivated ground cover, but has escaped at the end of the Road 3300120 and appears capable of growing under high canopy closure. It has grown over and killed existing native sword ferns and redwood sorrel at this site.

***Information Needs:*** It will be necessary to survey disturbed areas to detect new populations of noxious weeds before they become well established.

***Management Opportunities:*** It is especially important to control the brooms and gorse because they are just beginning to expand into the watershed and could potentially occupy much greater areas than they do now. It is also important to quickly treat any new colonies of new noxious weeds such as Yellow Star Thistle if they appear in the watershed, in order to prevent them from becoming well established. The silver nettle population should quickly be eliminated before it becomes established. Treatment of infected areas is needed to reduce, control and/or eliminate the further spread of noxious weeds in the watershed.

Treatment opportunities include cutting, pulling, or burning noxious weeds, introducing biological controls, closing roads, cleaning construction machinery before moving onto National Forest lands and before leaving infested sites, using only "clean" fill material, and using only certified weed-free hay. Seeding disturbed areas with native plant species will reduce opportunities for weeds to become established, and biological controls may be necessary to control widely distributed weed populations. Follow-up surveys of treated sites will be necessary to detect noxious weed population regeneration. Before ripping roads in contaminated areas, it should be determined if doing so would encourage noxious weeds to take over disturbed sites.

## Role of Port-Orford-cedar in the watershed

### *What are the locations and risk of spread of Phytophthora lateralis (Port-Orford-cedar root disease) in the watershed?*

Port-Orford-cedar (*Chamaecyparis lawsoniana*) is an important component in this watershed. Of the 44,674 acres of National Forest land within this watershed, 15,000 acres contain some Port-Orford-cedar. Approximately 19 percent of these 15,000 acres is infected with *Phytophthora lateralis*. The disease is extensive; most tributaries within the Quosatana Creek watershed are infected (see Map 20, Port-Orford-Cedar Distribution).

There are also large stands of POC further northeast along the south side of the Rogue River near the Illinois River. These stands, however, have only a scattering of root disease infection pockets at this time. *Phytophthora lateralis* is most prevalent where there is evidence of past human activities.

The natural range of Port-Orford-cedar is limited to northwestern California and southwestern Oregon but is found on many geologic zones and soil types, ranging from skeletal to productive soils. It is often the dominant tree in ultramafic riparian areas and frequently codominant with Douglas-fir in riparian areas of other geologic types. Crown closure by the species ranges from 0 to over 40 percent. Generally, however, throughout most of its range, it is restricted to areas with consistent water seepage within a meter of the soil surface. Port-Orford-cedar is valuable both ecologically and economically.

Port-Orford-cedar provides shade, large wood, and vegetative diversity on riparian and upland sites. It is fairly tolerant of shade and competition in natural stands, and can occur as a pioneer, late seral or climax species within the same stand. Growth is usually slower than Douglas-fir except in ultramafic substrates. Frequently, in mixed species stands, other species will grow taller and out compete them within 25 years of establishment. However, Port-Orford-cedar retains the ability to respond after dominants die.

In old stands, Port-Orford-cedar seems as tolerant of fire as Douglas-fir. Older trees develop thick bark and survive large, deep, fire scars. The wood has a high resistance to decay and insects. It can be especially valuable as large wood in riparian areas, remaining in streams longer than equal-sized logs of associated species. It can also have lesser value for cavity-nesters due to its decay resistance. If utilized, cavity-nesters seem to prefer dead Port-Orford-cedar over green.

Port-Orford-cedar timber brings higher prices than almost any other conifer in the United States due to log export to Japan. It is the only species than can be exported from federal lands within the Pacific Northwest. Its domestic price as lumber, however, is low to moderate when compared to the price of cedar species such as western red cedar or incense. Port-Orford-cedar boughs are used commercially for floral arrangements and have been collected along the road system in the watershed.

**Effects of Port-Orford-cedar root disease (*Phytophthora lateralis*) on the watershed**

Around 1952, an exotic root disease fungus or water mold, *Phytophthora lateralis*, was introduced into the Pacific Northwest from an unknown source. Both Port-Orford-cedar and Pacific yew (*Taxus brevifolia*) are susceptible to this disease, but yew are not readily killed

This root disease lives within infected roots and wet wood and soils It can be spread either by infectious "swimming" zoospores or thick-walled "resting" spores. These spores are spread by gravity, water, infected soil or woody debris. The disease can spread locally by root-to-root grafting. The infectious spore (zoospore) is only formed in water or when soils are saturated They are capable of moving a few millimeters through water or saturated soils to reach a fine root of a host tree by use of their small tail. This microscopic movement is directionally triggered by a chemical attraction to Port-Orford-cedar.

These zoospores attach to the live, fine roots (less than 1 mm in diameter) of Port-Orford-cedar that are normally abundant near the soil/water interface. After they are attached, they extend hyphae and grow throughout the root system and phloem up to the root collar of the tree These hyphae give off enzymes that break down the cells of the cambium of the tree. Once introduced into the cambium of the tree, this disease will grow until the entire root system is colonized and the tree dies from desiccation generally in the spring or summer.

During adverse conditions such as dry weather, the fungus produces thick-walled spores (resting spores) These spores are the principal fungal forms in mud, and enable longevity of the fungus by providing a mechanism for surviving inhospitable conditions Dry conditions reduce the danger of spread by spores but do not kill the fungus or its resting spores. Limited data indicates that infected soil can contain viable spores for approximately three years after the last host tree has died. Host tissue killed by this disease can also harbor thick-walled resting spores that can survive for up to approximately seven years while the Port-Orford-cedar host material decays. Under favorable conditions (saturated soils, cool soil temperatures, etc.) these resting spores produce the infectious zoospores.

A single introduction of the root disease into a waterway occupied by host trees can result in the spread of this disease to any adjacent, downstream, riparian area via water movement. However, the uphill distribution of this disease is slow because without an outside vector (carrier), this disease can only spread by root-to-root contact between infected and uninfected host trees. Discontinuity of host tree root systems is a barrier to its uphill spread.

Since 1952, this disease has been spreading throughout the range of Port-Orford-cedar primarily by the movement of infected plant materials or contaminated water or soil spread by gravity, equipment, vehicles, humans, or domestic and wild animals. The potential for loss of all Port-Orford-cedar stands to this root disease is low because of the existence of numerous protected populations representing both the environmental extremes and the middle of the species range. Currently, however, there is no identified genetic resistance or established chemical control for this disease. Prevention seems to be the most effective control strategy.

The primary vectors for spread of this root disease have been infected Port-Orford-cedar plant materials, waterflow, human transmission (such as root disease spores being introduced via the mud on vehicles, equipment, tools or boots), and animal transmission (such as hooves of horses, cattle or migrating wild animals such as elk). The greater the potential for one of these vectors to move from an infected area to an uninfected area with these spores, the greater the risk of infecting an uninfected area. The spread of this root disease, therefore, is a function of the number of vectors, the risk that the vector has picked up spores, the proximity of the infected area to an uninfected area, and the likelihood that a vector will move from an infected area into an uninfected area.

Spread of the disease in the future will most probably be associated with spore introduction via either unwashed heavy equipment or general vehicle traffic during the wet season. General traffic can spread this disease over long distances. Mud has been observed to stay on vehicles for trips over 30 miles, including trips of 15 miles on four-wheel drive roads (Forbes, 1993). Within riparian areas this disease will continue to spread to areas where water provides a vector for the spores. Additionally the disease will be spread through activities such as hiking, horseback or mountain bike riding, hunting, collecting special forest products such as mushrooms, beargrass, Christmas trees, and animal migration. Many of these activities occur primarily during the fall wet-season when the risk of spread is high.

Sanitation treatments (i.e. killing or cutting Port-Orford-cedar trees) and seasonal or year-around road closure can be effective in maintaining uninfected Port-Orford-cedar populations or limiting the spread of this disease. Year-around road closures within infected or uninfected areas and sanitation of stands containing Port-Orford-cedar adjacent to roadsides have been implemented within this watershed. Dry season operations, aggregate surfacing of some roads, use of uninfected water and earth, and pre-operation washing of vehicles and equipment have also been implemented. These latter measures can be effective in preventing the spread of the root disease, and are the preferred project-level control measures.

***Management opportunities:*** Continue with pre-operation washing of vehicles and equipment, use of uninfected water, soil or rock, sanitation of Port-Orford-cedar, and seasonal or year-around road closures as well as other reasonable control or prevention measures

## Role of Fire in the Watershed

***What is the historic perspective of fire in the Lower Rogue watershed, and how can fire be beneficially employed in the future?***

Fires have left evidence of their presence throughout the Klamath Mountains Geologic Province, including the analysis area. Fires with both natural and human causes have influenced the area for thousands of years.

The topography, vegetation, and weather of the area are typical of the inland canyon areas of southwestern Oregon. Slopes range from moderate (40 percent) to very steep (over 80 percent), with a very small amount of flatter ground located along the river benches. Mixed conifer stands, with a heavy hardwood shrub and tree component, dominate the landscape. Naturally occurring fuel loads are moderate, with relatively low rates of spread under average fire season conditions, but these fuels can burn much more severely under dryer late season conditions or in years of prolonged drought. Timber harvest changes fuel load patterns. Managed stands are distributed throughout the watershed on National Forest System lands. The majority of the private land in-holdings were mostly harvested by the mid-1970s (see Map 21, Regeneration Harvest and Roads).

The summertime climate of the watershed spans a wide range of conditions, from cooler and moister marine air which will generally invade the lower reaches of the watershed, to conditions dominated by the hotter and drier airmass which prevails over the inland areas. A distinct differential in afternoon temperatures can be found when traveling between Quosatana Creek and Bradford Creek, along the Agness road. The entire canyon along the length of the watershed (below the 1000 to 1500 foot level) can be filled with fog in the early morning hours, but will generally have burned off by 10:00 A.M. each day. Ridge winds are experienced at the higher elevations, and the lower points in the drainages feel the effects of the winds in the main canyons. The entire watershed is subject to the diurnal wind influence that is created by heating and cooling each day, generally blowing down slope (down canyon) during the early hours of the day, and upward during the afternoon and evening hours. During the late summer and into the fall, atmospheric conditions bring hot and dry east winds to the entire area. These winds generally overpower the local winds, move at unusually high velocities, while maintaining very high temperatures and low humidities for 24 hours a day. Lightning storms in the watershed are often accompanied by enough rainfall to extinguish fires or prevent them from growing before suppression action has been taken. During the past 80 to 90 years, (since record keeping began) human caused fires have accounted for at least three-quarters of the fire starts and the vast majority of acreage burned.

**Range of Conditions and Trends:** From prehistoric times through the early part of this century, fires were allowed to burn unchecked. Weather and natural terrain features were the only things that affected the spread of wildfire. Up until the 1930s and 1940s most fires were simply monitored, as effective fire suppression resources and tactics did not exist. Since then, fire detection and suppression resource delivery capabilities have become more effective and fire suppression policies have mandated that all fires would be controlled. Prior to 1940 the average number of acres burned per year on the Siskiyou National Forest was 20,833, after 1940 the average was reduced to 2,772 acres per year. Because of the low frequency of fire occurrence and the success of fire suppression, the majority of natural stands remaining throughout the watershed have evolved without the opportunity for fire to play its natural role for more than a half-century.

Although there is limited historical evidence of naturally caused wildfire in the watershed, many stands reveal evidence of what can only be interpreted as prehistoric fire. Charring and fire scars on old-growth conifers can be found most anywhere in the watershed. Stand composition characteristics, particularly homogeneous stands of young conifers, mixed hardwoods, or brush fields would indicate that a stand resetting disturbance such as fire has occurred in many areas. Panoramic pictures taken from lookout sites and aerial photography, both taken between 1934 and 1940, depict these indications of fire across the watershed; indicating that our historic records show only a small portion of the effects of fire across the landscape through time.

It is known that Native Americans used fire during prehistoric times for many reasons including enhancing forage and habitat for game which they hunted, stimulating the growth of plant species used both for food and to make baskets, clearing travel paths, protecting valued habitats from unwanted fire, and for both defensive and offensive warfare against rival tribes and European settlers. It is likely that valley bottoms, open meadow areas, and oak stands of the watershed were manipulated in this manner.

Early settlers also used fire, but there intent was to create more uniformity in the landscape, rather than the diversity sought by the native inhabitants. Fire was used to create and maintain grazing land for their livestock, as well as clear vegetation for mineral exploration. These settlers were often irresponsible in their use of fire, causing fires to burn far outside of the desired areas; and in some cases, just to see fire burn. Various agricultural endeavors can be seen on the available photography of the prairies on the north side of the Rogue River. This photography shows evidence that fire was likely used to keep the areas clear, and that in some cases had previously burned far beyond the edges of these openings. Accounts have been passed on of pioneering families being able to ride horseback through many areas along the river corridor, citing that the ground cover and undergrowth was relatively sparse; quite a contrast to the conditions found today.

**Historic Fire Activity**

Historic fire information is drawn from copies of the Regional Fire Atlas and Record (1910 to 1959) and from individual fire reports from the 1960s to present. The records cover a total time span of 81 years, 64 years of which can be accounted for. There are 6 data gaps, totaling 17 years, for which no records can be located at this time. Fire statistics were collected for areas within the National Forest boundaries only.

These records indicate a low frequency of natural fire occurrence. There were 14 lightning fires recorded, none grew to more than 5 acres in size, most fires were recorded as one acre or less. During this same period approximately 43 human caused fires have burned, with 25 of these fires growing to more than 5 acres in size, burning an estimated 14,500 acres. One large human caused fire in 1917 burned approximately 11,000 acres, approximately 8,500 was within the watershed, covering the north face of the Rogue river from Painted Rock Creek to the Forest boundary, and from the river to the ridge top between Lake-of the Woods and Sawtooth Rocks.

The majority of the large fires occurred prior to 1940, with 3 fires burning approximately 100 acres since that time. Nineteen other fires were reported since 1940, but all were controlled at less than 5 acres each.

Typical of fires west of the Cascade crest, the effects of burning appear to be more severe on the south and east aspects, and at higher elevations; then on the north and west aspects, and at the lower elevations. Aerial photographs (circa 1940) and the panoramic photographs taken from Lake of the Woods lookout point (circa 1934) reveal evidence of portions of fires which correlate well with fires documented in the known records. Several of these fires have the appearance of having been high severity, stand-resetting disturbances, particularly on the southern aspects and along the ridge tops. This same photography, covering areas of known historical fires, will often show little or no signs that a fire has passed through the northern and/or western aspects of an area, supporting the conclusions that a fire of lesser severity normally burns on these sites.

## Present Day Fire Management

This watershed is allocated almost entirely to management areas where preplanned suppression strategies and acre objectives are set to control fires at a minimum size (Siskiyou LRMP, USDA, 1989). For Late-Success ional Reserves the ROD (USDA and USDI, 1994) has set standards and guidelines which emphasize the prevention of loss due to large scale fires, particularly stand resetting disturbances. Under the ROD and the South West Oregon LSR Assessment, fire may be used for its beneficial effects to the ecosystem, including hazard reduction to prevent or reduce the potential undesirable impacts of unwanted wildfire in the LSR, once a specific Fire Management Plan has been written for the area. Until then, rapid wildfire suppression will remain the operative plan for the majority of the watershed.

For the past decade funding for firefighting resources has been declining, leaving only limited resources available in the local area to respond for initial fire attack. Aerially delivered firefighting resources (rappelers) can respond to the area in approximately 35 to 45 minutes from their base in Merlin, when available. A cooperating agency, Coos Forest Protective Association, off-Zone agency personnel, contractors, and air tankers can be called upon when and if a fire situation exceeds the control capabilities of these initial attack resources. Private land holdings, within and adjacent to the watershed, are protected by Coos Forest Protective Association. Under a reciprocal mutual aid agreement, Forest Service firefighting resources share in protecting these lands; utilizing the closest forces concept.

Mutual risks exist with the Agness community, recreational river use running the full length of the watershed, and private lands surrounded by National Forest (NF) lands. A wildfire originating on NF lands could be a threat to the privately owned lands, under severe burning conditions, and similarly, a fire originating on the privately held lands could pose a threat to the surrounding NF lands under similar conditions.

## Interpretation

It is difficult to determine what a natural range of variation for fire occurrence, extent, and intensity may have been prior to Euro-American settlement. Atzet and Martin indicate we do not have a clear picture of the natural range of conditions, as it pertains to the role of fire in the Klamath Province."...our temporal window is small. Disturbance regimes of the last 300 years hardly give the range our ecosystems have experienced." (Atzet and Martin, 1991) Since natural fire events are random and chaotic in nature, we can not model what the fire cycles were, or what the pre-historic "status-quo" was. Prior to 1850, information about climate, fire regime, and Native American activities is scarce. Conditions since 1850 poorly represent natural conditions due to the influence of early settlement. The study of historic fire records, depicting the human influence on the number and size of fires during the 1st half of the century, and the effects of active fire suppression during the 2nd half; supports this uncertainty in establishing the range of natural conditions. The evidence suggests that multiple, low intensity underburns were more prevalent than individual high severity stand re-setting fire events, throughout the Klamath Province. Studies within the Klamath Province found that evidence of fire was present in approximately 63 percent of the stands examined, and that it was the last and most important disturbance to occur.

Fire cycles west of the Cascade Mountains are estimated to be considerably longer than those found in east of the Cascades, particularly in Northeastern Oregon. This effect is even more pronounced along the westside of the Coast Range. While the coastal forest region is generally thought to be of a wet climate, with few fires occurring at longer return intervals, the forests in the Klamath Province are dominated by a more Mediterranean type of climate, where fire has played a very active role Referencing conditions in Northeastern Oregon, the forest health situation and the effects that fire exclusion has had on it; can be used to point to a similar path of events that may be occurring in Southwestern Oregon, on a much longer timescale. It is only in the past 60 to 75 years that human influence has attempted to alter this course through suppression policies and active intervention Atzet and Martin suggest that this intervention has increased the mean interval between fires (approximately 50 years), in the Douglas-fir series. Continued suppression will lead to an "unnatural" build up of fuels, resulting in a greater proportion of high-severity fires when an area finally burns. This concept is being recognized throughout the western United States, as it relates to the issues of forest health and the increasingly catastrophic affects of wildfire on the landscape.

There is evidence that Douglas-fir stands in the area are at risk of imminent mortality due to over crowding. Under growth has begun to occupy the majority of the ground, and dead fuels are building to the point where fire severities could prove lethal to entire stands. Unique habitats such as meadows are being encroached upon by conifer species. Certain hardwood species, which naturally grow under mostly open conditions, have been over-topped and crowded out by these same conifers. Comparison of the 1938-40 aerial photographs to present day conditions would indicate an overall loss of landscape scale diversity. All of these are "indicators" that the disturbance process of low intensity fire has been absent from these sites for an inordinate period of time.

Fire will continue to occur and will continue to be suppressed within our limited capabilities, but not all fires will be contained at low acreages. If a fire occurs under moderate weather conditions, and in areas where fuel and weather conditions are such that the fire burns with a lower intensity, the forest in general could benefit and the values associated with Late Successional Reserves will remain intact and/or be enhanced. However, fires burning under hotter and dryer conditions can evolve into stand replacement disturbances, producing undesirable effects on a very broad scale. As time passes and the amount of fuel on the forest floor continues to increase, so will the severity of fire.

***Management Opportunities***: The Southwestern Oregon LSR Assessment allows fires to burn in the Late Successional Reserve (LSR) areas, under site-specific objectives. A Regional Ecosystem Office (REO) review of this assessment confirms this. The LSR assessment recognizes that fire can be used for the enhancement of fire dependent species and habitats and prevention of stand replacement fire events; as a part of allowing fire to return to the LSR. These objectives can be met using either naturally caused or management-ignited prescribed fire.

In the Lower Rogue watershed, prescribed fire can also be used to reduce the fire hazard of selected areas, where its use can be implemented in a safe and effective manner. Such an action would give the limited fire suppression resources of the area a more manageable situation for preventing wildfire from generating effects beyond those considered beneficial to the resource, as well as aid in protecting the interests of those living in the area surrounded by National Forest lands.

# SOCIAL ASPECTS

The following characterization and key questions were developed to describe the past, present and potential future human uses of the Lower Rogue River Watershed Analysis Area, below the Illinois River.

## Cultural Characterization

The Lower Rogue River Watershed, below the Illinois River, can be characterized as a dynamic landscape. For millions of years, the Rogue River evolved without the influence of humans. Over the last several thousand years, Native Americans and early settlers discovered and utilized the river and the surrounding terrain functioning as integral parts in the evolution of the watershed as it appears today.

The river, the land, and the resources available have set limits and provided opportunities for prehistoric and historic inhabitants alike. Interactions between natural and human forces have shaped the human use of the area. Flat, open land, preferred for human use, is limited within the watershed. Aggregations of people are limited by topography.

Prehistorically, the stream and river corridors were used as resource procurement areas dealing with shellfish and anadromous fishes. Upland areas were also seasonally used as procurement areas and as travel routes. In historic times, the lure of mineral wealth or land to settle attracted people to this difficult terrain.

The history of human use within the lower Rogue River watershed, below the Illinois River, can be reconstructed and interpreted by examining the physical remains and historic records of previous inhabitants as well as observable changes which are the results of human activities. Remains, examined in conjunction with information provided by the natural environment and historical records, can reveal patterns of human behavior and adaptation. The lower Rogue River watershed contains both prehistoric and historic sites which represent every cultural milestone in the local history. Archaic to historic contact period prehistoric sites, early settlements, Indian war, mining, Depression Era sites and early Forest Service sites can all be found within the analysis area.

The prehistory and history of the watershed are treated in Stephen Beckham's *Cultural Resource Overview of the Siskiyou National Forest* (Beckham, 1978). Additionally, Dodge, Peterson and Powers have compiled general histories of the region and fragmentary local histories exist in the form of oral histories, family journals, manuscripts and photo collections.

## Prehistoric uses of the watershed

### Paleo-Indian to Northwest Coast Culture

The archeological record attests to a continuous human occupation of Southwest Oregon for at least the last eight to nine thousand years. Study of the Marial site (35CU84, Griffin, 1983) on the Rogue River provides several carbon-14 dates beginning at 8,560 before present (B.P.), clearly establishing the antiquity of human life in this portion of southwest Oregon. Excavations carried out within the watershed, near the mouth of the Illinois River at the Tlegetlinten site (35CU59, Tisdale, 1986) unearthed materials from a later ancient culture, possibly dating from two major periods of use at 6,000 and 2,000 years ago. Human adaptations in southwest Oregon appear to have changed from a moderately mobile, hunting-gathering lifestyle to more sedentary, specialized economies. These changes are likely to have been influenced by the effects of population displacement and growth as a result of changing climates and environments in southwestern Oregon as well as in other areas. Parallels exist between ancient Oregon cultures and the lifeways of far-flung places. These similarities are based on the demands of human existence in habitats of a similar nature and illustrate the importance of adaptation to the environment as a factor in shaping human culture.

**The Northwest Coast Culture**

Native cultures of the Oregon coast belonged to the greater Northwest Coast culture area, which extends from Alaska, on the north, to Cape Mendocino, California, on the south. Although populated by a wide variety of different groups speaking a variety of languages, all of these groups shared a broadly similar way of life. Differences between them were solely due to local variations of the environment. On the current evidence, this riverine/maritime culture can be traced about 3,000 years into the past.

Athabascan speaking people occupied the watershed analysis area at the time of Euro-American contact, although they are considered relative latecomers to the region. The Athabascans may have brought with them a way of life more strongly oriented to riverine resources, displacing groups who followed a subsistence orientation characterized by a greater reliance on the uplands. The Athabascans are linked to changes in settlement pattern and technology which appear in the archeological record about 1,500 years ago along the coast and in the interior of southwest Oregon. These coastal groups, whose territories also extended up the coastal rivers, spoke various dialects of the Athabaskan language. Collectively these Athabaskans are referred to as the Tututni or Coast Rogues, although each band had its own name.

Ethnographically, the Tututni are representatives of the final Native American cultural period in southwestern Oregon. These Athabaskan peoples inhabited much of southwestern Oregon from the beaches to the upland forests. They occupied the region from south of Bandon, Oregon to northern California and extended up the major drainages like the Smith, Chetco, Pistol, Illinois and Rogue Rivers. The bands were numerous and the locations diverse.

In 1854 J.L. Parrish, Indian Agent for the Port Orford District, attempted to compile a map and census of the Tututni within his district. Parrish described the lands of three bands of Tututni which were located on the lower Rogue River. Starting at the mouth of the river, "are the Yahshutes (or Yahshules), whose villages occupy both banks of the To-To-Tin or Rogue River, at its mouth. These people claim but two and a half miles back from the coast, where the To-To-Tin commences The Yahshutes claim the coast to some remarkable headlands about six miles south of Rogue river." The latter headland must be a reference to Cape Sebastian. The 1854 census by Parrish reported the "Yahshules" numbered 130 individuals with their major "chief" being Ene-wah-we-sit. Moving inland up the Rogue River are, "the To-To-Tins, from whom is derived the generic name of the people speaking the language, resides on the north bank of the To-To-Tin river, about four miles from its mouth" (approximately the mouth of Squaw Creek) "Their country extends from the eastern boundary of the Yahshutes, a short distance below their village, up the stream about six miles, where the fishing grounds of the Mac-an-o-tins commence. Mac-an-o-tin village is about seven miles above that of the To-To-Tins, and is on the same side of the river" (near the mouth of Lobster Creek). "They claim about twelve miles of the stream." Parrish's census reported the "To-To-Tin" numbered 123 individuals in a single village, with their major "chief" being One-an-ta The Mac-an-o-tins numbered 146 individuals led by "chief" Yap-see-o-we-lee. Parrish also mentions that between the three bands only the To-To-Tin possessed any firearms – they had three guns Whether these groups maintained strict territorial boundaries delineating upland resource areas is unclear At one point, Parrish describes the bands holdings as "reaching back from the coast indefinitely", while in a later reference he states, "As the Indians derive but a small portion of their sustenance from the country, they attach but little value to the surrounding mountains, for which reason their boundaries, except along the coast streams are in many cases undefined, and in others vague and indefinite.

A later map, a compilation of the works of Alex Ross and E-ne-a-ti, 1884, and a research paper by Jay Miller and William Seaburg indicates that the watershed was shared by a larger number of groups, or perhaps a finer division of the three groups noted by Parrish. This division includes the Ya-Shu-Wi-Tunne (Ya-Shute or Ya-Shule or Joshua) at the mouth of the Rogue on the north side, the E-Ni-Tunne on the south side of the Rogue, the Na-Tsu-Tunne also on the south side of the Rogue, but higher in elevation and further south, and the Tcet-Les-Can-Tunne or the "next south village". Again moving up the Rogue River these sources mention the Tu-Tu-Tunne (or Do-To-Dene') on the lower Rogue, the Tcet-Les-I-Ye-Tunne on the north side of the Rogue below Tu-Tu-Tunne, and the Macano-Dene' (or Mi-Kono-Tunne) on the Rogue River from Lobster Creek to the Illinois River.

The general pattern of Tututni settlement indicates that large winter villages, containing 50 to 150 individuals, were established along coastal areas, rivers and major streams. Houses constructed at village settlements were substantial. "Their houses are constructed by excavating a hole in the ground twelve to sixteen feet square and four or five feet deep inside of which puncheons or split stuff are set upright six or eight feet high. Upon the top of these boards or thatches, are places for the roof. In the gable end a round hole is made sufficiently large for the entrance of one person. The descent is by passing down a pole upon which rude notches are cut which serve as steps. These houses are generally warm and smokey." (Parrish, 1854) Each house had a central fire area with a small smoke hole above. The earthen floor was packed solidly to keep out moisture and was often covered with mats of cattail fibers. Another structure constructed in the village site was the sweathouse. Built by the men of the village this was a semi-subterranean, earth covered structure with an entry on one side and a hole for dropping down fire heated rocks on the other. The sweathouse could be sealed to more effectively hold in the heat. These villages served as semi-permanent habitation spots, where foods collected throughout the year could be stored for use in the winter. In the summer, when traveling to fishing sites or food gathering locations these people erected simple brush shelters around a central fire pit.

As mentioned above, major Tututni villages were known to have existed at the mouth of the Rogue, at the confluence of the Rogue and Squaw Creek and at the confluence of the Rogue and Lobster Creek. No traces of these village sites have been discovered as of this date; they have never been excavated or documented. Although these village sites have never been excavated, parallels may be drawn to what life must have been like in these villages by comparing them to the Shasta Costa Village Site, 35CU161. Winthrop and Gray did a limited amount of testing at this site in 1988 due to the site being repeatedly vandalized and damaged by erosion.

The Shasta Costa village site was located at the south end of a terrace opposite a riffle in the river which provides an excellent fishing spot. A long time resident who lived along Shasta Costa Creek at the turn of the century, reported twenty-two housepit depressions, about 15 to 20 feet across and 2 to 3 feet deep at this location. Burials and trade beads were reported coming from this site, as well as abundant fresh water mussel shells (Lucas interview, 1971). Excavations at this site indicate that Shasta Costa terrace was a significant habitation site over a very long period of time. Cultural materials thirty feet below river laid sediment suggest the antiquity of the site, although no date can yet be assigned to the lower component. The detailed descriptions of the site at the turn of the century, which include reports of intact housepits, fire rings, and mussel shell mounds as well as local reports of Indian fishing practices at Shasta Costa riffle suggest that the site was still occupied near the time of contact. Cultural investigations indicate that the site has several components, and has a complex range of artifacts relating to various tasks and demonstrating at least three stone working technologies. One of these technologies involves flaking river cobbles and using the flakes, a practice not previously recognized at sites investigated along the Rogue River. This technology may possibly be related to fish processing

This site has been repeatedly disturbed. Early settlers reportedly cleared the flat of trees around the turn of the century, and later farmers leveled some areas along the top of the terrace (Rusty Hill interview, 1987). The 1964 flood inundated the terrace and deposited 6 to 18 inches of silt as other, older floods must also have done. Bank erosion has also been heavy in the past. This prehistoric site has also been repeatedly vandalized. Four potholes were visible on the site when it was investigated in 1987.

Village inhabitants usually consisted of families related through the male lineage. Marriages took place between individuals from different villages, with the bride going to the husband's home. This practice of marrying outside of your own village fostered mutual respect and cooperation between the villages, for the individual had certain ties and responsibilities with his in-law neighbors. Status within the group derived from wealth, measured in goods such as dentalium shells, woodpecker scalps, obsidian blades, bear and sea otter furs, sea lion teeth and slaves. The wealthiest man was the leader, and an individuals social standing depended upon the bride price of his mother.

Generally, the Tututni were hunter-gatherers, subsisting on a diet consisting primarily of salmon and acorns and supplemented by a variety of game and collected food items. A seasonal round of activities was practiced which is characterized by dispersed, small, task-specific groups utilizing the upland areas during the spring and summer months. These hunting and gathering groups would traverse the upland areas in search of game, plants, nuts, berries and other raw materials. Temporary camps in the uplands consisted of grass covered, brush or animal hide shelters. Fall signaled the time for communal fishing and acorn gathering and the occupation of winter villages by multi-family groups. In winter, these people would subsist largely on stored resources collected during the summer and fall.

The material found in the various sites in the watershed indicates considerable use of the river corridor and the resources contained in and adjacent to the river. Like other Indians along the northwest coast of this continent, the tribes of southwest Oregon made extensive use of fish resources, especially the salmon. The fish of the Rogue River and its tributaries were the most important of animal foods. Communal fish weirs and fishing scaffolds were erected in the waterways where, due to the abundance of the fish runs, the basic food resources for an entire year could be procured in a few weeks of work. In addition to fish weirs, these people used many techniques for taking fish: dip nets, basketry fish traps, hook and line, nets and spears were all used to collect this important resource. The indigenous people were also highly skilled in the construction and use of watercraft and the rivers were important transportation routes.

The coastal Athabaskans also had access to a vast array of subsidiary animal foods provided by the shoreline environment. Chitons, limpets, clams, snails, barnacles, sea urchins and crabs were easily collected by women and children in the estuaries and tide pools. Sea mammals such as seals and sea lions were other marine animals exploited by the coastal natives along with an occasional beached whale. Inland groups probably made seasonal trips to visit their coastal relatives and obtain the resources provided by the ocean through trade and barter.

For the Athabaskans living away from the coast, the dependence upon camas and acorns was much more significant than for the residents along the sea. For inland peoples the acorn became the most important staple in the diet. The Athabaskans preferred the acorns of the tanoak, but in years of poor tanoak acorn production, the acorns of white and black oaks were also utilized. The acorns were ground into flour by use of a flat stone and a basket hopper with a open bottom. The acorns were then leached free of tannic acid by placing the flour in a bed of sand and repeatedly pouring water over the flour. The flour was then stone boiled in a basket to produce a mush. Camas and brodelia bulbs were baked in stone lined pits and were also important plant foods.

The hunting of big game, especially deer, elk and bear were also of great importance to the diet. Covered pits, and game drives utilizing deer fences and snares were commonly employed as well as the bow, arrow and spear. Small game, seeds, insects, berries, birds and eggs also rounded out the diet of these inventive peoples.

It has been typical of Euro-Americans in the past to assume that Native American hunting and gathering societies had very little direct control of or impact upon the territories they occupied. However, a re-examination of the literature, coupled with more careful interviews with Native informants, has turned up a wealth of data about intensive management techniques employed by indigenous peoples. The most powerful of all control methods was the use of fire Reasons for the use of fire included game drives, maintaining wildlife habitat, procurement of tarweed and grass seeds, acorn gathering and oak grove management, hazel gathering and management, improving the quality of basketry materials, root and berry propagation, extraction of sugar pine sap and seeds, insect collection, tobacco cultivation, warfare, communication and ceremonial purposes.

Various tools and other artifacts not only establish site locations, but also reveal the types of resources being utilized and the types of technologies being performed. A number of sites and isolated finds have been located within the watershed and are representative of the common upland site types found in the Siskiyou National Forest. These include temporary campsites related to hunting and gathering activities such as 35CU203 (SK-689), the Wagon Wheel Meadow Lithic Site and 35CU204 (SK-683), the Lithic Spring Site. Typical artifacts found in these temporary camps include lithic debitage, the waste material from the manufacture of stone tools, and the tools themselves, such as projectile points and scrappers. Although no finished tools were found in either of these two sites, a biface was discovered at the Lithic Spring Site. The debitage found at both sites indicate the middle to late stage debris associated with the latter stages of the lithic reduction process. Lithic technologies at these two sites focused on the completion, re-tooling and repair of stone tools.

Temporary campsites are often located on or near major ridge lines which were used as travel routes, such as the Lithic Spring Site, or in areas where diverse vegetation encouraged the collection of unique resources, such as is found at the Wagon Wheel Meadow Lithic Site. Physical features at the latter site location such as a favorable southerly aspect, the presence of water on site and flat areas for setting up a camp indicate that the site was most likely a hunting and gathering campsite. The presence of vegetation utilized by prehistoric peoples such as tanoak, wild iris, sugar pine, beargrass and various wild berries, as well as meadow areas where grass seeds or flowering tubers such as camas and brodelia could be gathered, would be a strong encouragement to establish a temporary camp. A third example of a site based on resource procurement is SK-162, the Moorsky Acorn Site. This site is located in a grove of tanoak and consists of fragments of granitic rock. The fragments have one convex face, smoothly polished and appear to be remnants of acorn processing tools. They may possibly be the bases of hopper mortars.

Another upland site type common on the Forest is the lithic quarry. It represents a site where the procurement of raw materials for the production of stone tools was the focus of activity. 35CU218 (SK-1121), the Rock Knob Quarry, and 35CU219 (SK-1122), Paul's Small Quarry, are examples of this type of site within the watershed. Pits dug into outcrops of chert, a cryptocrystaline stone capable of being knapped, and extensive surface rubble from lithic reduction activities typify this site type. The "testing" of chert cobbles found on the surface for purity (that is glassy texture, lack of fractures and absence of intrusions of other minerals) is also another indication of a quarry site. Debitage found at these sites is predominantly large blocky shatter and flake fragments typical of early core shaping activities. Hammerstones of a material not native to the site are also common. These hammerstones range from softball to pebble size. This range represents the lithic reduction sequence from course quarrying work to the fine work required to shape a biface.

Other types of sites which can be found within the watershed offer insights to the religious and spiritual nature of the Native Americans in the area. Religion played an important role in the lives of the indigenous inhabitants. The shaman was a person of considerable consequence in the hierarchy of the local group. An individual might seek direct contact with the supernatural during a vision quest, often conducted in the uplands away from the village. The vision quest was one of the most fundamental and widespread religious concepts of North American Indians, including the inhabitants of southwest Oregon. Certain rites of passage were key in the life cycle of these aboriginal people, the vision quest being one of the most important. This rite was performed by young men and women at puberty on the bald peaks and headlands of the region. The vision quest was undertaken to seek a guardian spirit and to obtain supernatural power. The vision seeker sought the aid of the spirit world through prayer, dreaming, fasting, dancing and going without sleep until a guardian spirit came to the candidate in a vision. An individual could undertake more than one vision quest in his or her lifetime in search of spiritual aid and guidance.

A number of vision quest sites are located within the watershed analysis area including: SK-012, the Agness Vision Quest Site, SK-124, the Waters Vision Quest Site and SK-060, the Signal Buttes Vision Quest Site. SK-060, the Signal Buttes Vision Quest Site, is typical of this type of site. The vision quest site consists of two rock rings situated on a rock pinnacle which is one of several in the immediate area. This site provides a commanding view of the Rogue River and Hunter Creek drainages as well as the Tututni village site. The vision quest rings are circular walls of stones approximately four feet in diameter and varying in height from a single course of rocks on one of the rings to a multiple tiers of rocks to 59 cm in height on the other ring. The pits are large enough to contain one person and are arranged in a semi-linear orientation. This site retains a high degree of physical integrity, although it is suspected that it has been disturbed in the past. The site was discovered by John McWade, part lower Klamath Indian, in the early 1970s. According to McWade, Yurok myths say that it was customary to have two rings during a vision quest, one for the spirit to descend into, and the other for the vision seeker to sit in. These sites are outstandingly significant, Class I cultural resources as they represent a traditional socio-religious practice of the native peoples. Not many of these vision quest sites have been found in southwest Oregon.

The major ridge tops which surround the watershed were also used by the aboriginal inhabitants as trade and travel routes. As previously mentioned, temporary campsites are often located along these ridgetops. Evidence of trade can be assumed from the artifacts found in various sites. The presence of material such as obsidian, not native to the area, is proof of intercourse with the interior regions. Sourcing of obsidian from various excavations indicates a widespread trade network reaching into northern California, south central Oregon and the central Cascades. In exchange, coastal products such as shells, dried salmon, salmon oil, deerskins and camas root found their way inland. Historically, trails and later roads often followed these aboriginal travel routes.

From an examination of the historic and ethnographic record, it does not appear that the land inhabited by the Tututnis was heavily occupied at the time of white contact. However, there are some indications that the population had declined dramatically because of disease even before Euro-Americans arrived in southern Oregon. Dr. Lorenzo Hubbard, speaking about the Tututni residents of the lower Rogue River in 1856, said: "According to tradition, many years ago they were far more numerous than at the present time, wars and diseases having in some instances destroyed whole tribes. The marks of old towns and large settlements everywhere found, now entirely deserted, are strong evidence of the truth of their traditions." (Hubbard, 1861)

Glimpses of these people and their way of life have been made known to us through ethnographic information, the journals and manuscripts of the early white explorers and settlers, records and accounts from the Rogue Indian Wars and the archaeological record as it pertains to the Northwest Coast Culture area. The ethnographic information that exists for these people was acquired from research conducted at Siletz and Grande Rhonde reservations and the Smith River rancheria. However, by the time the interviews or ethnographic sketches were compiled in the late 1800s and the early part of this century, most sources of information were already a generation removed from tradition.

## Historic uses of the watershed

The historic period in this portion of southwestern Oregon begins as early as the 16th and 17th centuries with the voyages of the Spanish explorers. The earliest recorded contact between the coastal natives and Europeans is noted in the logs of Captains George Vancover and Robert Gray in 1792. Within the next quarter century trappers and traders, including North West Company fur trader Peter Corney and an American party of trappers led by Jedediah Smith, appeared in southwestern Oregon. Russian fur hunters, traders and whaling ships of various nations also had contact with the native people on this portion of the coast.

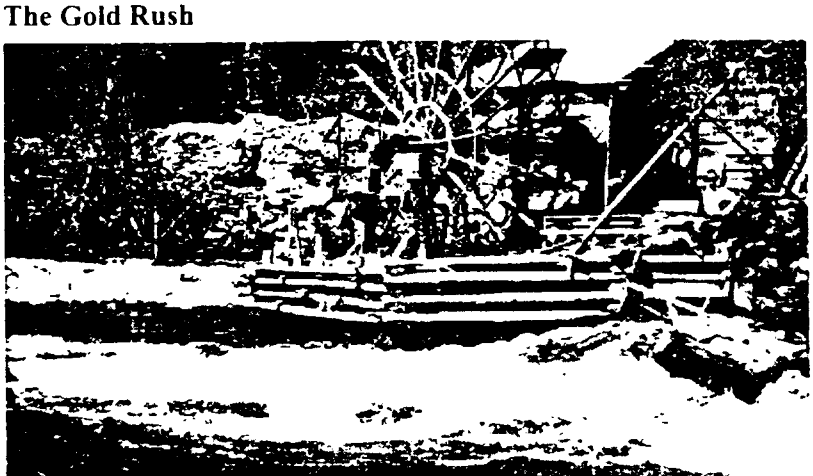
The trapper Jedediah Smith was the first white man with a sizable company to make the land trip between California and Oregon along the sea coast instead of through the Umpqua and Willamette valleys. The year was 1828. The party, which had 300 horses and mules, numbered eighteen men, who trapped as they traveled. By late June Smiths party had entered the Oregon Territory and approached the Rogue River. Smiths journal entry reads as follows:

"June 27th North 7 Miles. With the exception of two or three steep points which I was obliged to pass over I was able during the day to travel along the beach. I encamped on the south side of a bay and close to its entrance which was 150 yards wide. The Bay itself was 3 Miles long and 1 Mile wide. At low water I found it quite fresh, from which circumstance I inferred that it received a considerable river. After encamping I made rafts that I might be ready to cross the bay early on the following morning. On each side of the Bay were several indian villages but the indians had all run off. On a creek which I crossed 3 miles back was some beaver sign and also some in the bay."

There were a large number of Indian lodges on both sides of the river. Upon the approach of the strangers all the inhabitants fled, the women not even stopping to carry off their large burden baskets. Smith's party tore down one lodge to get puncheons to make rafts, as timber was scarce along the beach. The Indians raised smoke signals on the north side of the bay.

"June 28th N N West 6 Miles. Early in the morning as it was low water I commenced crossing. And when I had finished I had lost 12 or 15 drowned in the middle of the water. I know not the reason for their drowning unless it might perhaps be ascribed to driving them so much in a body. In three days I had lost by various accidents 23 horses and mules."

**The Gold Rush**


Miner's Arastra on Lower Rogue River

Some of the first Euro-American settlers in the area were miners attracted to the region during the gold rush era. In 1849 gold was discovered at Sutter's Mill in California and prospectors flocked through the inland valleys following the California-Oregon Trail. Very quickly, the richest gold producing areas of California were claimed and late coming prospectors spread out into the surrounding countryside in their quest for precious metals. By 1851 the prospectors had reached southwest Oregon and in that year the first discovery of gold in Oregon occurred on Josephine Creek. Other gold strikes were soon to follow. Gold was first discovered on the coast at places like Whiskey Creek and Gold Beach, named for the gold rich, black sand deposits found there. Later, gold deposits were found in the Rogue River. Early prospectors left little of the local country unexplored and in the ensuing years every area along the Rogue River with gold in sufficient concentrations was mined. Mining within the watershed lasted from the middle of the nineteenth century through the 1940s. The search for gold in the Rogue River has had and continues to have an effect on the social and economic conditions, past and present of Curry County.

Mining is one of the most visible of the historic activities which occurred in the watershed. Only a handful of settlers and miners were living in the lower Rogue River region in the late 18th century and almost all were involved in some type of prospecting activity. Evidence of mining or prospecting for gold, nickel and chrome can be found within the analysis area. During World War I, and again in the years preceding World War II, the Federal Government began offering incentives for mining strategic minerals such as chrome. Although temporary in nature, this industrial development was significant in the history of the watershed. A mining district was established in the Signal Buttes area and the associated activities and impacts of mining are still visible today. Other mining sites can also be found in the surrounding areas and tributaries of the lower Rogue River.

When initial contact was made between Euro-American and native cultures along the southwestern Oregon coast relations can be characterized as generally friendly, or at least the cultures avoided one another. However, this situation rapidly deteriorated. During the period between 1840 and 1855 thousands of transient miners and permanent settlers entered southwest Oregon. They were soon followed by merchants, packers and farmers. Encouraged by the Donation Land Act of 1850, the majority of the newcomers who would become permanent residents entered the area in the years between 1850 and 1855. The consequence of this increased emigration was competition between the cultures for space and resources. This situation, coupled with racial and ethnocentric biases, eventually lead to armed conflict in 1853. Ultimately, ill feelings between the native populations and the Euro-Americans exploded into the Rogue River Indian Wars of 1855-56.

**The Rogue River Indian Wars**

Significant events of this conflict took place within the watershed analysis area. Early in the year 1856 stories of clashes, brutality and massacre in the inland valley of the Rogue had filtered down to the coastal peoples undermining what little confidence the Tututni had in their white neighbors. The arrival of inland refugees and agitators as well as the presence of armed volunteers (the Gold Beach Guard) camped directly across the river from the Tututni village created a volatile situation. Outrages and retaliation by both parties soon brought the situation to a boiling point and the coast warriors decided to strike first. On the night of February 22 the coastal bands attacked the camp of the volunteers and swept through the pioneer settlements killing twenty three persons and burning every building they found, including most of the town of Gold Beach. The offensive was well planned and executed. The survivors of the attack, most of who were attending an all night dance, as well as a few who had escaped to hide in the surrounding woods, ferried across the river to the north side of its mouth to a half completed structure they called Fort Miner. Reinforcing their "fort", the miners and settlers found themselves safe, but isolated and surrounded. The siege lasted until March 21st when the trapped survivors were rescued by the arrival of soldiers and volunteers from Crescent City and Fort Orford.

Colonel Robert Buchanan, commander of the coast military operations, now launched a campaign up the Rogue River against the Indian strongholds. His first inland expedition could not be deemed a success for although the soldiers burned the Shasta Costa village at the mouth of the Illinois River, poor weather and lack of supplies forced their retreat back to the coast. A portion of the force eventually reached Fort Orford "totally without provisions and nearly naked."

Buchanan hesitated to commit his forces to the wilderness when spring rains and insufficient supplies threatened his success in the field. However, he dispatched a force of 112 men commanded by Captains Ord and Floyd-Jones to the principle Mikonotunne village located in a meadow near Skookumhouse Prairie and the mouth of Lobster Creek. The soldiers reached the village and began to burn the plank houses and stores abandoned by the Mikonotunne. Seeing this, the Indians retaliated and close combat for the village ensued. Slowly the soldiers began to take the upper hand. At least five of the defenders died in the fight and another three drowned while trying to escape from the battle in their canoes. Two soldiers were also wounded in the engagement. Captains Ord and Floyd-Jones, unable to pursue the Indians across the river, withdrew at once towards the coast and Buchanan's camp. The troops mission was celebrated as a great success as it was the first to dislodge the Coast Rogues from one of their inland strongholds.

A second, though far less gallant, event of war took place at this same location just a short time later. SK-034, the Lobster Creek Battle Site (Massacre Rocks) is located at the confluence of Lobster Creek and the Rogue River. Survivors of the Gold Beach Guard, supplemented by new recruits, were anxious to revenge their losses. On April 22, 1856 these forces traveled up the Rogue and concealed themselves in the massive boulders at the mouth of Lobster Creek. Shortly, two canoes containing twelve men and three women came down the stream. When they passed beneath the rocks, the volunteers opened fire and killed all but three of the unsuspecting people.

Following a treaty meeting at Oak Flat in May of 1856, Captain A.J. Smith and a reinforced company of Army Dragoons proceeded to the Big Bend of the Rogue River to accept the surrender of several of the Indian bands. However, an Indian force composed of various inland and coastal bands and led by Chief John, an Applegate River Takelma, advanced on the soldiers forcing them into defensive positions. The fighting at the Battle of Big Bend continued for 30 hours and it was only the arrival of Captain C.C. Auger with a company of infantry that saved the embattled force. The Indians were forced to withdraw from the field. The Battle of Big Bend was the last significant battle between the United States Army and the various tribes of southwest Oregon during the Rogue River Indian War. The result of the battle broke the fighting spirit of the Indians and essentially concluded the war. The bands soon surrendered and the "hold-outs" were tracked down and captured. The majority of the native population was forcibly removed to the Siletz and Grande Rhonde reservations. With the removal of the native inhabitants at the conclusion of the war, the area was opened to settlement.

**Euro-American Settlement**

Early settlers and miners trickled into the Rogue River area during the 1850s and 1860s. They often built their homes on the same river or stream terraces that had provided homes for the native inhabitants. The remoteness and difficult access precluded extensive development and most people followed a subsistence-oriented way of life. This lifestyle made maximum use of the available fish and game, supplemented with produce grown and animals raised on small farms. The grassy ridge tops were attractive to early stockmen and are often the sites of early homesteads. Goods and services were traded, bartered and scavenged. Cash earning activities were limited and population densities low. Small-scale mining, and the sale of livestock and fish provided some income to local residents. Archeological sites that chronicle historic settlement within the watershed include cabin remains, trails, mines and camps used by miners, homesteaders and packers.

The Huntley/Woodruff Homestead, SK-103, is a prime example of the homesteading efforts of these early Curry County pioneers. Located in Wagon Wheel Meadow these historic remains include the remnants of a horse corral, fence lines and a collapsed cabin. A pigpen, developed spring, outhouse, trash pit and a fruit tree orchard can also be found on the site. Research into the Curry County census records reveals that the earliest recorded homesteader associated with this site is Thomas Huntley. Thomas Huntley was the son of pioneer miner John Huntley (Curry County census, 1870) who mined the gold rich black sand deposits at Ellensburg (Gold Beach). Thomas Huntley occupied the site at Wagon Wheel Meadow as early as 1890 raising livestock including cattle, horses and pigs. The General Land Office (GLO) survey plat of 1893 shows the T. Huntley cabin at the intersection of the "Trail From Illinois River to Gold Beach" and the Wagon Road, SK-690. A Homestead Entry Survey (HES) for this property has not been located. Thomas and his wife Martha (Curry census, 1900) raised five children in the area.

Calvin Woodruff, son of early pioneer miner Lyman Woodruff (Curry census, 1860), was a contemporary of Thomas Huntley. It is not clear when he acquired title to the property from Huntley, but an early Siskiyou National Forest map of 1937 attaches the Woodruff name to the site. Calvin and his wife Hattie also raised five children on the homestead into the 1940s. In the remains of the cabin can be found both round and square nails, as well as both hand split and milled lumber. The cabin structure therefore contains elements of both early and modern construction materials and building techniques. The cabin was probably repaired and/or rebuilt a number of times. Cedar stumps with springboard notches around the margin of the meadow display the local source of building and fencing material.

Another example of homesteading activity within the watershed analysis area is SK-684, the Moritz Fritsche Cabin Site, home of one of the more colorful characters in the local history. The Curry census of 1900 lists a "Mort Fritsche, age 39, birthplace Germany, as a resident of the county. His occupation is listed as stock raiser. He homesteaded in the Quosatana drainage near Wildhorse Prairie. The Siskiyou National Forest map of 1911 shows the trail which accessed the meadow where Fritsche had his homestead (SK-133, the Fritsche Trail), while the map of 1915 identifies a "Fritsche Ranch" in the same location.

John Adams, game warden, recounts that when he ran some cattle up to Wildhorse Prairie, "Old Moritz Fritsche had a fit ... he considered that all his country." Adams referred to Fritsche as " .... quite a panhandler. He'd get some guy to go in with him and they'ed put out the traps. Then Fritsche would run him off." Fritsche did lots of reading and " ... liked to talk about it too. He was a hard-headed German; even if he knew he was wrong, he'd still be right." These oral accounts were from the 1930s. At that time Fritsche would have been in his late sixties. Apparently his sight was giving out, for according to Adams " ... Fritsche met us and said, 'John, vill you tell me vere my @#!&#* cabin is?' He was pretty near in sight of it then, but he got lost every time he got out into the brush."

Little is left of the cabin site, although a sign marks its location. Near the sign is a leveled area with the remains of a shingled wall and several notched logs and scattered lumber. Fruit trees, fence lines and scattered trash are all that remain of the homestead of this unique individual.

### The U.S. Forest Service

The Siskiyou National Forest was established on October 5, 1906. Henry Haefner, an early forester in the area states, "In 1909 the National Forest area was about as the Indians had left it. Nothing of importance had been done to improve the property or even find out what it contained in the way of timber or other natural resources." The early foresters duties included mapping, estimating the amount of timber and agricultural land, law enforcement, fire protection, as well as a multitude of other jobs involved with the administration of a large timberland. The rangers often built their own stations and headquarters.

Various trails, lookouts, camps, guard stations and telephone lines were constructed within the watershed during the first three decades of this Forest's history. Wildhorse Lookout, SK-689, was first established in 1929 as a fireman's cabin, and replaced in 1931 with an R-1 type lookout cabin. In 1935 this was upgraded to a 40-foot pole L-4 tower. The present structure was constructed in 1947 as a Standard '36 L-4 house mounted on a forty foot sawn lumber tower with a catwalk. The "Standard '36" model was characterized by a hipped roof, two-over-two light windows and door, and ceiling joists which extend two feet beyond the cabin to support the shutters. Major interior features include wood built-in cabinets and an Osbourne Firefinder. Wildhorse Lookout, as with such other lookouts including, SK-1101, Lake of the Woods Lookout, formed a protective ring around the rim of the watershed. Their presence is significant for its critical role in the development of the fire detection and suppression systems in rugged southwest Oregon. The lookouts helped assure that a reliable and abundant timber supply would support Curry County's post World War II economic growth.

Early communications in the watershed consisted of primitive phone lines connecting the various lookouts to the ranger stations and the towns of Agness and Gold Beach. Examples of these lines of communication are: SK-604, the Snow Camp Phone Line and SK-1113, the Pine Grove Trail #27A and Phone Line. SK-125, the Lake-O-Woods Trail, not only provided access to Lake of the Woods Lookout from Agness but also serviced the grabaphone – Kellogg telephone system installed in the stations in these early years. According to historian and Fire Control Officer for the Gold Beach Ranger District, George Morey, "The Forest Service started and completed a telephone line the seven miles from Agness to Lake-of-the-Woods Lookout in 1915." This date is verified in L.J. Cooper's "A History of the Siskiyou National Forest" in the section highlighting year-by-year accomplishments. As with other remnants of phone lines, portions of telephone wire and tree hung ceramic insulators can still be found today.

An important component of the historic fabric of the watershed is the trail system. These transportation corridors were the first travel routes within the watershed and many of these paths followed older aboriginal routes. "Chief" Elwin Frye identified SK-1113, the Pine Grove trail #27A and SK-125, the Lake-O-Woods Trail as Indian travel routes. Frye was a packer for the Forest Service and the grandchild of early Rogue River settlers John and Adeline Billings. Other historic trails within the watershed include: SK-615, the Gold Beach-Agness Trail, SK-110, the Lower Rogue River Trail and IF-315, the Hume Trail remnant. Trail systems effectively linked the coastal area with the interior of the Forest, and the interior with the Rogue Valley. Many were routes that the miners, and the packers that supplied them, established to get their materials to and from the prospects. Others were used to drive cattle to summer pasture. During the first three decades of this National Forest's history, the trail systems were improved and expanded. Today many Forest roads follow these historic trail routes. Other remnants of these trail routes form a portion of today's recreational trail system.

### The Depression Era

The Depression of the 1930s brought an influx of people to the public forest lands. Numerous out of work individuals sought survival in the mountains undertaking a subsistence economy lifestyle just as the earlier settlers had. These people were also engaged in prospecting and small-scale mining encouraged by the revaluation of gold. Some of the older claims and gravel bars along the river were probably re-worked at this time.

In the 1930s the federal government created through New Deal legislation a number of programs of work-relief to combat the impact of the depression. In southwest Oregon the development of the Civilian Conservation Corps (CCC) formed an important chapter in the local history. Fire prevention and suppression, tree planting and timber stand improvement, range improvement, soil conservation, road building and forest facilities construction were all undertaken by the CCC volunteers. The Civilian Conservation Corps provided employment and a measure of financial relief for the enrollees and their families.

After completing their basic training at Fort Lewis, Washington, the first CCC units were assigned to Agness, Oregon (SK-695) near the mouth of the Illinois River. The original contingent of thirty men were soon re-enforced by more and more CCC units. At Agness the challenges involved the difficulty of getting supplies, equipment and materials to the project areas. During their first summer and fall the Agness unit cut the first cat road between Agness and Illahe. During the same time period, they also constructed a new suspension bridge across the Rogue River, layed out an airport in Illahe, constructed their own camp and erected four new buildings at the Agness Ranger Station (SK-119). The Agness Ranger Station is a premiere example of Civilian Conservation Corps construction methods, materials and techniques.

### The Modern Era

Perhaps the single most effective factor shaping life along the river has been its isolation from the rest of the world. The first road did not reach the upper reaches of the watershed until well into the twentieth century. Not until the 1960s did a road provide access from Agness to the coast, or did power lines bring electricity to the local residents. In the early decades of the twentieth century recreational use of the streams, rivers and forests has added a new economic emphasis to the area. Guides and packers often adapted older cabins and camps to their new enterprises and a new breed of recreational hunters, fishermen and ecologically inspired tourists provide an alternative income to the local economy. Agness maintained its position as an important terminous for the river boats and enjoyed the added benefit of income generated by tourists. Logging became a major regional industry only after the Second World War as roads were constructed in the area.

The Smith Ranch, SK-282, and the Smith Ranch Home Site, SK-691, are examples of how a single locality can display a variety of uses over time. The Smith Ranch locality is a broad flat, consisting of several river terraces, encompassing about fifty acres. Two major prehistoric sites are in the near vicinity and, although no specific references relate this flat to prehistoric activities, the location suggests that it was used. Also, the terrace accumulates silt during floods and may contain buried deposits. The flat was originally homesteaded by the Smith brothers between the years 1913 and 1918, though the old cabin is long gone. The brothers lived a subsistence lifestyle and were locally well known for the honey they produced from several hives of bees. There was also a lumber mill in the area. A large steam boiler was brought up the river by barge for this mill. Too heavy to salvage, the boiler remains on the site today. As the years passed the property changed hands a number of times and the last owners created a different sort of "homestead" for themselves. This was the recreational residence, and the cabins that were built on the terrace during this period date from the 1940s and 1950s.

Even though the historic element is by far more tangible than that of the prehistoric, much of this cultural fabric within the watershed is little known. Many of the sites in the watershed have not been formally documented or evaluated for their historic significance.

### *Does the watershed contain any culturally significant traditional use areas?*

There is no evidence which suggests that the area within the watershed is presently used for traditional activities by local Indian groups. Recognized tribes consulted (Tolowa, Karok, Coquille and Siletz) did not provide any additional information regarding traditional use in the watershed analysis area. The Confederated Tribes of Siletz has expressed an interest in gathering traditional forest products such as pine nuts, lodge poles and beargrass. If requested, the gathering of forest products would be administered by the standard permit system.

***Information Needs:*** The complete status and number of cultural sites in the watershed are unknown. Formal site evaluations of many sites have not been conducted.

***Management Opportunities:*** Cultural resource surveys will precede all ground disturbing projects. All sites discovered will be documented and added to the Forest inventory. The significance of inventoried sites shall be evaluated for eligibility for the National Register of Historic Places. Suitable cultural resource properties may be interpreted for recreational use and educational benefit of the general public. There is an opportunity for partnership with the recognized tribes in the development of recreational and educational programs.

## Recreational Uses

### *What are the major recreational uses in the watershed and where do they occur?*

The Rogue River watershed from Agness to the mouth is a diverse watershed for recreational use on the Gold Beach Ranger District. This section of the Rogue River corridor receives the highest number of visitors of all watersheds on the District. Today, recreational activities include motorboating, viewing the river and scenery by tour boats, fishing, hiking, hunting, swimming, camping, picnicking, recreational driving and a small amount of downriver floating with rafts, drift boats, canoes and kayaks.

The Rogue River was one of the eight original rivers designated as Wild and Scenic by Congress in 1968. From Agness to Blue Jay Creek, it is classified as "Recreational" (1.5 miles). From Blue Jay Creek to Slide Creek (7.5 miles), it is classified as "Scenic"; from Slide Creek to Lobster Creek (7 miles), it is classified as "Recreational". The Wild & Scenic designation ends at Lobster Creek. From Lobster Creek to the mouth of the Rogue River it is designated as an Oregon Scenic Waterway.

The Rogue River and trails provided original primary access in the watershed. Trails were improved and a road was constructed from Agness to Illahe and from Agness to Powers. Beginning in the 1950s and continuing to the 1990s, roads were constructed primarily for timber harvest activities. With these roads, and the road from Gold Beach to Agness being completed in the early 1960s, recreational driving, hunting, and camping increased as a recreational activity.

#### *River Use*

The Rogue River is internationally known for its fisheries which account for much of the early recreation on the river. Drift boats were used for salmon and steelhead fishing through the Rogue River canyon and motorboats were used to bring people upriver. In the 1920s and 1930s, the Rogue became famous for sport fishing, due in part to pioneer river guides like Glenn Wooldridge, who made the first motorboat trip from Gold Beach to Grants Pass in the early 1940s. The writing of Zane Grey also contributed to is fame. The number of people fishing and recreating increased to support lodges along the river and in Agness. Known internationally for decades as a "fish highway", the Rogue River attracts anglers vying for its four annual runs of fish: spring chinook salmon (April through June), summer steelhead and fall chinook salmon (August through November), and Winter Steelhead (December through March). Most of this fishing is from motorized boats, although there are a large number of anglers that fish from the river bars and from drift boats. Fishing continues to provide the largest and most important social and economic segment of non-commercial and commercial recreational use on the Rogue River.

Commercial tour boats provide another major recreational use of the Rogue River in this watershed. Tour boats take visitors up the river to view and experience its whitewater, scenery, wildlife, and other resources. Tour boats began with the Rogue River Mailboats taking passengers as well as mail from Gold Beach to Agness. This started in 1938 and became more popular in the 1940s after an article about the trip was published in Sunset magazine (Personal communication with Ed Kammer, September, 1999). Today, there are two tour boat companies that operate out of Gold Beach. Virtually all tour boat operation occurs between May 1 and the end of September. Approximately 50,000 passengers annually take tour boat trips from Gold Beach to the Agness area and further upstream.

Noncommercial boat trips for sightseeing, fishing, and camping are not limited on the Rogue River below Agness; the annual number of trips is large, but the average number of passengers per boat is far smaller than that of the commercial tour boats. Commercial and non-commercial anglers use the river heavily as the fish run during spring and fall, with less use in winter and summer.

### *Riverside Camping*

There are numerous sites where people camp along the river between Agness and the mouth. This camping is divided into roaded and unroaded river access. Unroaded river bar camping use in the summer is steady, with peak times occurring on Jet Boat Marathon Weekend in early June, and the July 4th and Labor Day holiday weekends. The focus of this camping use seems to be boating and camping. A few hikers use the sites that are on the north side of the river along the Lower Rogue River Trail. Roaded river bar camping use is much larger, and its focus is on camping and fishing from near-by camp trailers or motor homes, with very little boating involved.

There are also numerous private recreational vehicle parks and campgrounds and one river lodge on or very close to the river shoreline. These businesses accommodate thousands of riverine campers annually. Those located on the north side of the river are accessed off U.S.Highway 101 by the North Bank Rogue River Road, while those on the south side are accessed off U.S.Highway 101 by Jerry's Flat Road. Some of these facilities provide boat launching, while the customers of the other facilities use the area's primary boat ramps at Forest Service campgrounds (Lobster Creek and Quosatana Creek) and at the Port of Gold Beach.

### *Trails*

Trails in the watershed provided access for Native Americans, followed by miners and settlers. The most heavily used trails in this watershed are the Frances Shrader Old Growth Trail, the Myrtle Tree Trail, and the Lower Rogue River Trail. Other trails include the Fritsche Cabin, Woodruff Meadow, and Pine Grove Trails.


**Lower Rogue River Trail near Painted Rock Creek**

The 13-mile Lower Rogue River Trail from Agness to Silver Creek is the main extended hiking trail used in the watershed. It is accessed by the Agness Road at the east trailhead and the North Bank Road at the west trailhead, approximately 15 miles from Gold Beach. It parallels the north side of the river and offers beautiful views of the river downstream of the Agness area. This trail is used primarily by hikers and mountain bikers. Recent budget allocations have reduced the level of annual maintenance. In 1999 the trail was closed due to fallen trees and logs and was recently re-opened to hikers only. The recreational use of the trail has increased over time, prior to the closure trail use was estimated at 1,000 to 1,500 hikers a year. The Gold Beach Ranger District is working this year to reopen the trail.

The Frances Shrader Old Growth Trail is approximately one mile long and features an easy grade, with 14 interpretive points to inform users about a coastal old growth forest. A pit toilet is located in the parking lot. Located approximately 12 miles from Gold Beach, it receives approximately 4,000 visitors, the largest use of any trail in this watershed. Its close proximity to the Myrtle Tree Trail and their relatively short distances from Gold Beach and U.S.Highway 101 accounts for the high amount of use. Last year, the gravel surface on the Shrader Trail was replaced with funds from the Trail Park Pass Program and with work provided by volunteers.

The Myrtle Tree Trail is 1/4 mile long, moderately steep, and switchbacks up to the world's largest known myrtle tree. Located approximately 10 miles from Gold Beach, it receives 2,000 to 2,500 visitors annually. A pit toilet is located at the parking area.

The Pine Grove Trail is seven miles long. The trail travels through an impressive Jeffrey pine grove about 2 miles from the Wildhorse trailhead. The trail ends at the Illinois River Bridge.

The Woodruff Meadow Trail accesses a pioneer homestead and a number of meadows. The trail has been re-opened by volunteers.

***Information Needs:*** The number of commercial fishing guide clients in the segment of river from Agness to Lobster Creek has not been tabulated separately from the number of clients from Agness to Watson Creek. The number of non-commercial boat trips and anglers (boat and bank) in this segment is not knowneither. The number of private recreational boat trips and passengers, and the number of riverside campers in the area from Agness to the mouth is not known.

***Management Opportunities:*** The Lower Rogue River Trail needs to be re-opened. The Myrtle Trail needs more gravel surfacing. The Woodruff Meadow trail could be improved and extended.

***Campgrounds and Dispersed Recreation***

There are two developed campgrounds in the watershed: Lobster Creek and Quosatana Creek.

Lobster Creek Campground is located approximately 10 miles from Gold beach on Forest Road 33 (Agness Road). It has six camping sites on one paved asphalt loop, with picnic tables, fire rings, two flush toilet restrooms, and a paved concrete public boat ramp. There is no potable water available. Camping is also available on the gravel bar (approximately 10 sites) adjacent to the boat ramp. Although this campground receives some local use, the majority of users travel from U.S. Highway 101. They use both the campground and the gravel bar, with the gravel bar receiving slightly more use than the campground

Quosatana Creek Campground is located approximately 14 miles from Gold Beach on Forest Road 33 (Agness Road). It has 43 camping sites on two asphalt paved loops, with picnic tables, fire rings, three flush toilet restrooms, asphalt paved footpath overlooking the river, RV dumping station, fish cleaning station, potable water, and concrete paved public boat ramp. There is a large gravel bar adjacent to the boat ramp, but camping is not permitted there. This campground has long been favored by the public for its wooded camping areas, large, sunny, open spaces for recreating, accessibility to blackberries, and prime location for fishing at the gravel bar or upriver from the boat ramp.

Dispersed camping sites include the private gravel bar downstream of Lobster Creek Campground, Hawkins Bar, Dunkleberger Bar, Smith Orchard (Bar), the Lower Rogue River Trailhead, and Bradford Creek. The gravel bars are totally unimproved. The Lower Rogue River Trailhead has a pit toilet, and the Bradford Creek site has a picnic table.

Other dispersed recreational activities include driving to view scenery, hunting, bank fishing, swimming, wildflower viewing, and agate hunting. Road 33 from Gold Beach through Powers to Highway 42 has been designated as the Rogue-Coquille National Scenic Byway. The portion of the Byway within the watershed goes from Gold Beach to Agness and provides beautiful views of the Rogue River.

***Information Needs:*** The amount of dispersed recreation use is not known. Monitoring trips to determine the amount and types of use can be completed if funding is available.

***Management Opportunities:*** Occupancy in both National Forest campgrounds could be increased through press releases in area newspapers. In addition, camp hosts can supply area information centers with information and displays, a feature article in a local commercial newsletter, and signing at relevant road junctions. Another option for increasing occupancy is to offer amenities unavailable in the past, including firewood, ice, and soda sales. Potable water would substantially increase the occupancy at Lobster Creek Campground. Furnishing showers would substantially increase occupancy at Quosatana Campground.

The deferred maintenance backlog in the campgrounds needs to be addressed. Picnic tables and fire rings need to be replaced and the roads need to be re-paved. There is also an opportunity to provide the Bradford Creek dispersed camping area with a pit toilet.

## Commodities

### *What commodities can be produced from the watershed?*

#### Timber

At the present time, 86 percent of the National Forest portion of this watershed is being managed for late Successional Reserve, Riparian Reserve, and other non-timber resources. Ten percent is in the Matrix allocation, where commercial timber harvest is an objective. This is primarily in the Quosatana and Wakeup Rilea Watersheds. An additional four percent is in Partial Retention Visual, where commercial timber harvest must meet visual objectives, as seen from the Rogue River. This is in the Bradford, Bill Moore, Tom East, and Bridge Creek Watersheds.

Within Late-Successional Reserve, commercial timber harvest activities would be limited to removing tree encroachment from meadows and oak savannas, stand treatment to accelerate growth and development of early and mid-seral stands into stands with late seral structure, salvage of hazard trees adjacent to open roads, and salvage of trees if catastrophic events (fire or wind) occur in the future.

#### Special Forest Products

The special forest product in highest demand in this watershed is beargrass. Other special forest products include boughs, vine maple, huckleberry brush, Christmas trees, mushrooms, firewood, and salal. Impacts to the resources of the watershed have been minimal. Bough collection in the Coos-Curry Powerline corridor is a priority project to minimize trees growing up into the powerlines.

***Management Opportunities***: Special forest products may continue to be collected as the market dictates and in accordance with management area objectives and requirements. Beargrass will continue to be collected at a higher rate than other special forest products in this watershed.

### *What is the current and historic level of grazing in the watershed?*

Grazing probably began in the watershed in the 1850s. Morris Fritsche ran a small herd of cattle from 1890s to 1944 on Fritsche Prairie, Wildhorse Prairie and surrounding lands prior to and after the Siskiyou National Forest was established. For many years he "held domain" over the surrounding country, claiming it as his own. After the Forest Service took over he greatly resented the enforcement of a fee for the grazing of his cattle and threatened to kill Dick Helm, an early Agness Ranger who tried to collect the grazing fee (Haefner, 1975). The 1937 Siskiyou National Forest Range Management Plan stated Fritsche had applied for a permit to graze two head of cattle on the prairie (Martinek 1993).

The Adams Ranch on Adams Prairie was owned by George Richard "Dick" Adams from 1910 through 1947. The Adams' raised cattle, horses, sheep, goats and hogs on the ranch and surrounding country. The family also owned half of Skookumhouse Prairie, Soldier Camp Prairie, and Second Prairie (also known as Rock Prairie). Cattle grazed all of these prairies as well as the surrounding forested lands. The Adams' usually ran about 60 head of cattle from 1910 to 1960. The cattle were run down to the Miller Ranch where they were transported to market. The sheep mostly grazed Skookumhouse Prairie and secondarily at Adams Prairie. The goats stayed primarily on Adams Prairie. The family raised horses and used them as work animals on the ranch. Jack Adams purchased the ranch from his father in 1947. The family sold off the goats and sheep. Jack bought a tractor in 1948. The workhorses were still used after they bought the tractor, but to a lesser extent. The hogs were set out after weaning to run the country and fatten up on the falling acorns. Every year, in late winter or early spring, about 200 hogs were rounded up and either barged down the river on Fred Lowry's barge, or run down the Lower Rogue River trail and sent to market. In 1956 a road was built to the ranch and after that the hogs and cattle were transported out of the ranch by pickup truck (Information in this paragraph is from a March 17, 2000 Interview with Wayne Adams who lived on the ranch from his birth in 1944 until 1960).

The U.S. Forest Service maintained a pack string in the watershed until 1970 or 1971. From 1960 to 1970 or 1971, the horses were kept at Adams Prairie during winter, where the barn was available for the horses to get in out of the bad winter weather. During summer, the horses were kept at the old Agness Guard Station, where a barn and a tack room were available for use. Adams Prairie was also used for gathering hay through a special use permit from the late 1960s through mid 1970s (Joe Genre, personal communication).

In 1974, Glenn Hensley received a grazing allotment at Adams Prairie (USDA, 1989), and started a second grazing allotment at Skookumhouse Prairie in 1979 (USDA, 1989a). He ran between 30 and 40 cow/calf pair at the allotments until 1989, when he did not renew his permit. The private land below Skookumhouse (Lowry property) had cattle through the 1999. These cattle trespassed onto National Forest lands in the vicinity of Skookumhouse Prairie, but no legal allotment was ever established.

Another grazing allotment in the Bridge, Sundown, Stonehouse, Painted Rock and Morris Rogers watersheds was present beginning in 1936 or earlier (USDA 1966). Permittee L. Blondell ran 5 to 7 cow/calf pair in 1948. When the allotment was transferred to W.R. Scherbarth in 1956, cattle used the allotment from June through mid-October, but only 22 animal unit months were realized (4 cow/calf pair). The allotment was originally called the Lobster Range, but was changed to the Sundown Allotment after grazing in the South Fork of Lobster Creek was eliminated. Several meadows lost their forage value because they were "encroached by tree species and undesirable vegetation". This allotment was terminated in 1966 due to lack of access to available forage and incompatibility with industrial forestry.

There are no active grazing allotments in the watershed currently.

### Special Use Permits

A number of Special Use Permits have been issued in this watershed for private uses on National Forest including boat docks, waterlines, and electric sites A buried telephone line and an overhead powerline parallel Road 33. These lines supply telephone and electric service to residences along the road and to the town of Agness.

**Road Summary**

**Table 16. Miles of Roads in the Watershed**

| Watershed | Roads | Miles of Road |
|---|---|---|
| Quosatana Watershed | 47 | 52.2 |
| Bradford Watershed | 12 | 5.1 |
| Remainder of the Watershed (National Forest System Roads Only) | 106 | 116.8 |
| **Total** | **165** | **174.1** |

More information on roads within Quosatana Creek and Bradford Creek watersheds is in their respective watershed analyses.

## *Which roads are needed for future access in the National Forest portion of the watershed and which roads need treatment to protect the resources of the watershed?*

### History

Most early access to what is now the National Forest portion of the watershed was by river or trail. Wagon roads led to early home sites on prairies and river terraces. As early as 1890, a wagon road accessed the area near Wagon Wheel Meadow. By the time of the 1940 aerial photos, there were roads to homesites and ranches on both sides of the Rogue River near Agness, connecting to the Illahe Road that was constructed by the Civilian Conservation Corps in the 1930s. There was also a road to Wildhorse Lookout, accessed from the Pistol River Road; and wagon roads or well-developed trails bordering the northern ridges of the watershed and connecting to the farm on Adams Prairie.

In the 1950s logging roads were constructed on both sides of the Rogue River near Agness. After the bridge over the Illinois River just below Lawson Creek washed out in the 1955 flood, a ferry across the Rogue River downstream of the mouth of the Illinois provided access for logging trucks to haul timber from the hillsides on the south bank of the Rogue to the Agness-Illahe Road on the north bank, and to the mill. The ferry was replaced in 1964 by the Agness Road bridge over the Illinois.

The major road building effort to access National Forest land for timber harvest began in the early 1960s in this watershed. Within the decade, most of the watershed was roaded, and construction of spur roads continued through the early 1990s (see Map 21, Regeneration Harvest and Roads). Although they were originally constructed for timber harvest, today roads in the National Forest portion of the watershed are used for recreation, hunting, access to special forest products, fire suppression, and administrative access.

### Present Road Conditions

Agness Road 33 was constructed in 1964, providing roaded access between Gold Beach and Agness. The culverts in this road are now past their life expectancy and many are in poor condition and need to be replaced. The road crosses the many geologic faults and slump-earthflow features that the Rogue River flows through. These cause chronic road failures, drainage, and maintenance problems. Silver Creek Road 3533 on the north bank of the river upstream of Lobster Creek was also constructed in the early 1960s. Ditches and culverts are old, in poor condition, and beginning to cause road washouts. Roads in other subwatersheds may be in similar condition.

***Information Needs:*** Comprehensive road condition surveys need to be conducted. Many culverts are older than their life expectancy, in poor condition, and may fail, blocking roaded access as well as contributing to resource damage. Roads need to be evaluated for their contribution to access, with changing patterns of use in the watershed. High priority sites are roads with known poor culvert conditions such as Agness Road 33 and Silver Creek Road 3533; areas of "stacked roads" such as Bridge Creek; and subwatersheds with high road densities such as Nail Keg and Wakeup Rilea.

***Management Opportunities:*** Culverts that are in poor condition need to be replaced on primary access roads. Other roads that are needed for present and future access can be stormproofed to reduce the potential for both road damage and resource damage. Roads no longer needed for access can be decommissioned. Waste areas should be identified and developed as appropriate in the watershed.

**Road Classification**

Roads within the National Forest System are categorized in many ways; however, two principal categories are used in planning. The first is a general grouping of three types, based on a road's long-term use and need for monitoring of hydrologic function. This does not directly relate to the standard to which a road is constructed or maintained. The groupings are: *primary, secondary and candidate.* A road is considered "primary" if it is planned for long-term retention and is considered a main through-road. If a road is considered "secondary," it is usually a dead-end-road, is planned for retention based on administrative or public need for access and subject to re-evaluation as the needs change or diminish. A "candidate" road is usually used for access to an area for the purpose of a specific project and may be closed or decommissioned when that project work ends.

The second principal type of categorization, *Maintenance Level,* is more specific and is based on the first groupings in conjunction with other factors, such as type of vehicle that will be utilizing it. For example, "primary" roads usually provide access to mainstream activities such as campgrounds, boat ramps and picnic areas; therefore, they are maintained at the highest standard in order to accommodate the "low-clearance" vehicular traffic they receive. Maintenance Levels (MLs) range from one to five, where a "ML(1)" would be a low standard road, or "candidate" road that is not maintained, and an "ML(5)" would be a two-lane paved "primary" road that is regularly maintained for use by a passenger vehicle. Most roads range from ML(2) to ML(3) and are secondary roads which have a crushed-rock (aggregate) surface course and are maintained for either high-clearance four-wheel drive vehicles (ML2) or passenger vehicles (ML3).

**Table 17. List of Roads on National Forest Lands**

| Road Number | Length (miles) | Maintenance Level | Transportation Network Analysis |
|---|---|---|---|
| 3300000 | 17.2 | 5 | Primary |
| 3300090 | 5.2 | 3 2 1 | Primary |
| 3300094 | 1.7 | 1 | Candidate |
| 3300095 | 0.6 | 1 | Candidate |
| 3300120 | 1.2 | 2 | Secondary |
| 3300121 | 0.2 | 2 | Candidate |
| 3300200 | 1.2 | 2 | Candidate |
| 3300202 | 0.1 | 2 | Candidate |
| 3300204 | 0.1 | 2 | Candidate |
| 3300220 | 1.5 | 2 | Candidate |
| 3300222 | 1.0 | 2 | Candidate |
| 3300225 | 0.2 | 2 | Candidate |
| 3300226 | 0.2 | 1 | Candidate |
| 3300240 | 0.5 | 1 | Candidate |

| Road Number | Length (miles) | Maintenance Level | Transportation Network Analysis |
|---|---|---|---|
| 3300250 | 2.8 | 1 | Candidate |
| 3310000 | 0.5 | 3 | Primary |
| 3313000 | 1.0 | 2 | Secondary |
| 3313110 | 1.0 | 1 | Candidate |
| 3313118 | 0.2 | 1 | Candidate |
| 3318000 | 7.5 | 3 | Primary |
| 3318020 | 0.4 | 2 | Candidate |
| 3318040 | 0.2 | 2 | Candidate |
| 3318050 | 2.9 | 2 | Candidate |
| 3318051 | 0.2 | 2 | Candidate |
| 3318052 | 0.1 | 2 | Candidate |
| 3318053 | 2.0 | 2 | Candidate |
| 3318054 | 0.4 | 2 | Candidate |
| 3318055 | 1.7 | 2 | Candidate |
| 3318056 | 0.4 | 2 | Candidate |
| 3318057 | 1.0 | 2 | Candidate |
| 3318058 | 0.4 | 2 | Candidate |
| 3318060 | 0.1 | 1 | Candidate |
| 3318070 | 1.6 | 2/1 | Secondary |
| 3318072 | 1.0 | 1 | Candidate |
| 3318073 | 0.5 | 1 | Candidate |
| 3318074 | 0.5 | 1 | Candidate |
| 3318075 | 0.3 | 1 | Candidate |
| 3318076 | 0.1 | 1 | Secondary |
| 3318080 | 5.2 | 2 | Secondary |
| 3318081 | 1.0 | 2 | Secondary |
| 3318082 | 0.2 | 2 | Candidate |
| 3318083 | 0.5 | 2 | Candidate |
| 3318085 | 2.6 | 2 | Secondary |
| 3318086 | 0.6 | 2 | Candidate |
| 3318087 | 0.3 | 1 | Candidate |
| 3318088 | 0.5 | 2 | Secondary |
| 3318090 | 0.9 | 2 | Candidate |
| 3318092 | 0.3 | 2 | Candidate |
| 3318093 | 0.1 | 2 | Candidate |
| 3318100 | 0.2 | 2 | Candidate |
| 3318110 | 1.8 | 2 | Secondary |
| 3318113 | 0.6 | 2 | Secondary |
| 3318990 | 0.1 | 2 | Candidate |
| 3318992 | 0.2 | 1 | Candidate |
| 3318993 | 1.1 | 2 | Candidate |
| 3318995 | 0.3 | 2 | Candidate |
| 3318996 | 0.4 | 2 | Candidate |
| 3318997 | 0.2 | 2 | Candidate |
| 3318998 | 0.5 | 2 | Candidate |
| 3318999 | 0.2 | 2 | Candidate |
| 3336000 | 1.5 | 3 | Primary |
| 3340000 | 4.0 | 3 | Primary |
| 3340170 | 0.2 | 2 | Candidate |

| Road Number | Length (miles) | Maintenance Level | Transportation Network Analysis |
|---|---|---|---|
| 3340180 | 0.1 | 2 | Candidate |
| 3340200 | 1.0 | 2 | Candidate |
| 3340201 | 0.4 | 2 | Candidate |
| 3340202 | 0.4 | 2 | Candidate |
| 3340203 | 0.1 | 2 | Candidate |
| 3340220 | 1.5 | 2 | Secondary |
| 3340221 | 0.3 | 1 | Candidate |
| 3340222 | 0.2 | 1 | Candidate |
| 3340226 | 0.4 | 1 | Candidate |
| 3340227 | 0.2 | 1 | Candidate |
| 3340230 | 0.6 | 2 | Candidate |
| 3340260 | 1.5 | 2 | Candidate |
| 3340265 | 0.4 | 2 | Candidate |
| 3340500 | 0.4 | 2 | Candidate |
| 3340505 | 0.5 | 2 | Candidate |
| 3340700 | 1.7 | 2 | Candidate |
| 3340710 | 0.2 | 2 | Candidate |
| 3340712 | 0.1 | 2 | Candidate |
| 3340720 | 0.2 | 2 | Candidate |
| 3340850 | 0.9 | 2 | Candidate |
| 3340900 | 4.3 | 2 | Secondary |
| 3340905 | 0.2 | 2 | Candidate |
| 3340907 | 0.2 | 2 | Candidate |
| 3340909 | 0.2 | 2 | Candidate |
| 3340910 | 3.2 | 2 | Secondary |
| 3340913 | 0.2 | 2 | Candidate |
| 3340915 | 0.2 | 2 | Candidate |
| 3340920 | 0.1 | 2 | Candidate |
| 3340925 | 0.1 | 2 | Candidate |
| 3340926 | 1.5 | 2 | Candidate |
| 3340928 | 0.4 | 2 | Candidate |
| 3340930 | 0.6 | 2 | Candidate |
| 3340935 | 0.2 | 2 | Candidate |
| 3340940 | 1.1 | 2 | Candidate |
| 3533000 | 8.8 | 3/2 | Secondary |
| 3353250 | 0.2 | 2 | Secondary |
| 3353300 | 0.5 | 2 | Secondary |
| 3353310 | 0.2 | 1 | Candidate |
| 3353320 | 0.3 | 2 | Secondary |
| 3353340 | 0.6 | 2 | Secondary |
| 3353350 | 0.7 | 2 | Candidate |
| 3353380 | 0.2 | 2 | Candidate |
| 3353390 | 0.5 | 2 | Secondary |

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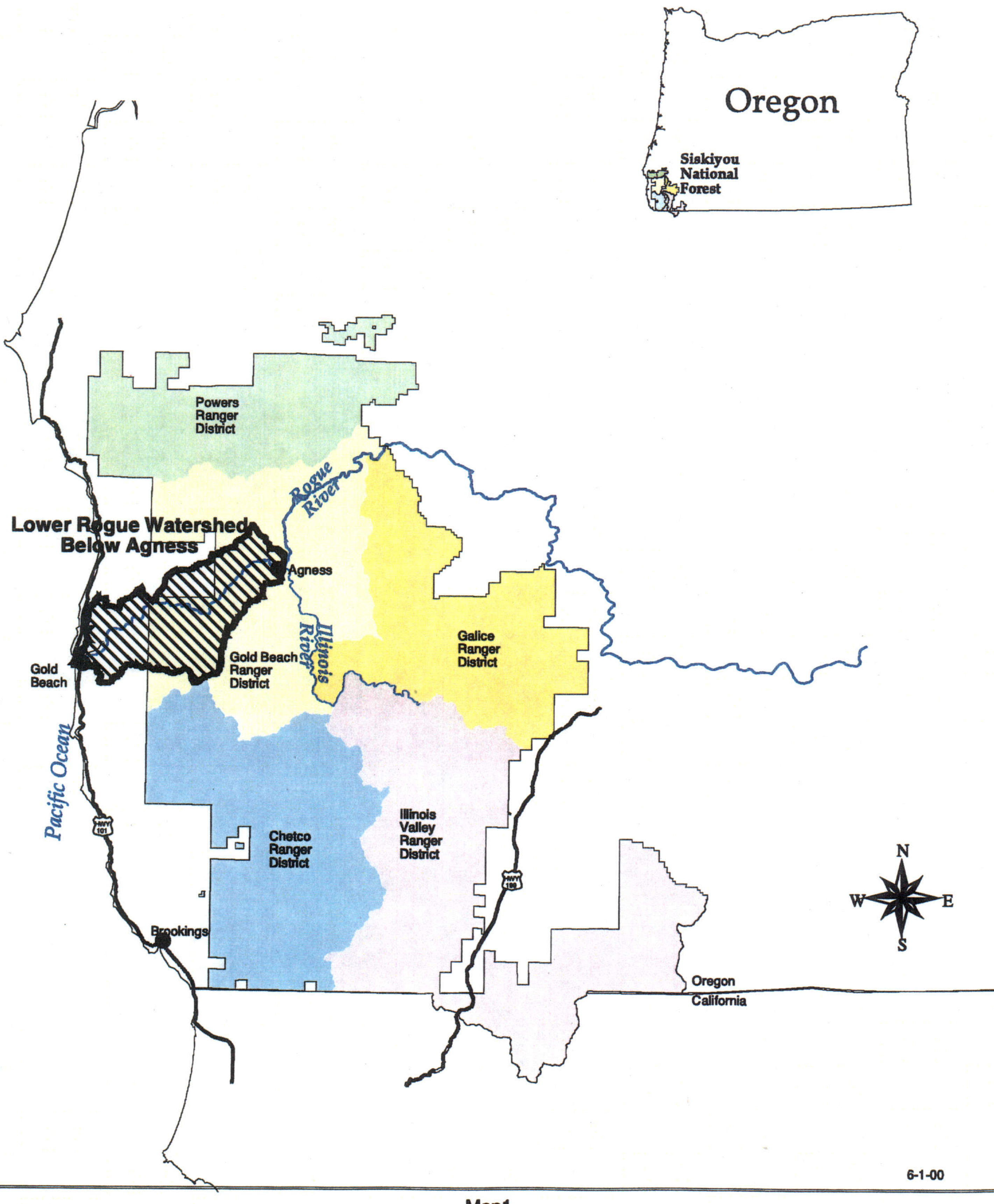
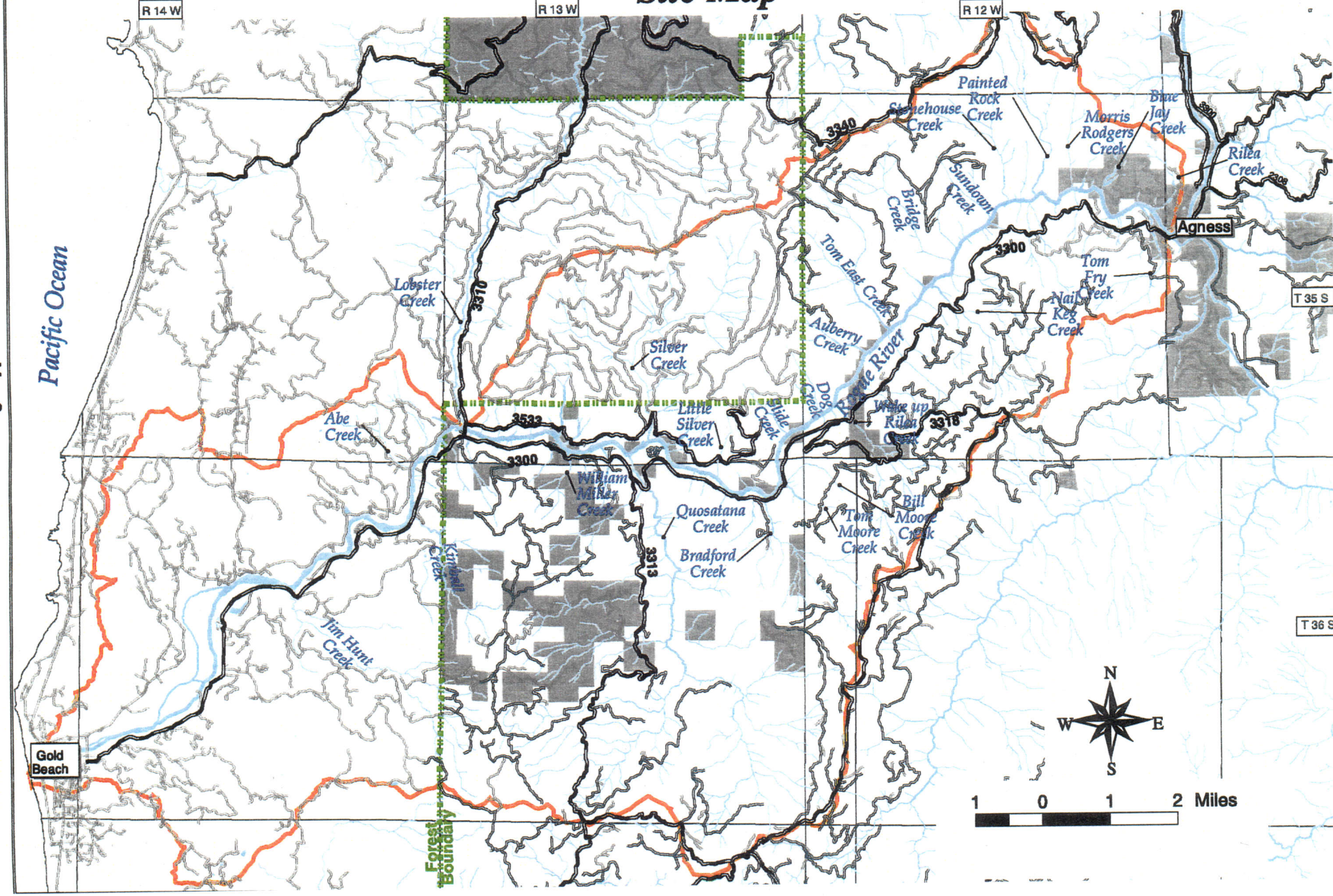
http://www.wais.access.gpo.gov (Federal Register on-line via GPO access)

# MAPS

# Lower Rogue Watershed - Below Agness
# Vicinity Map



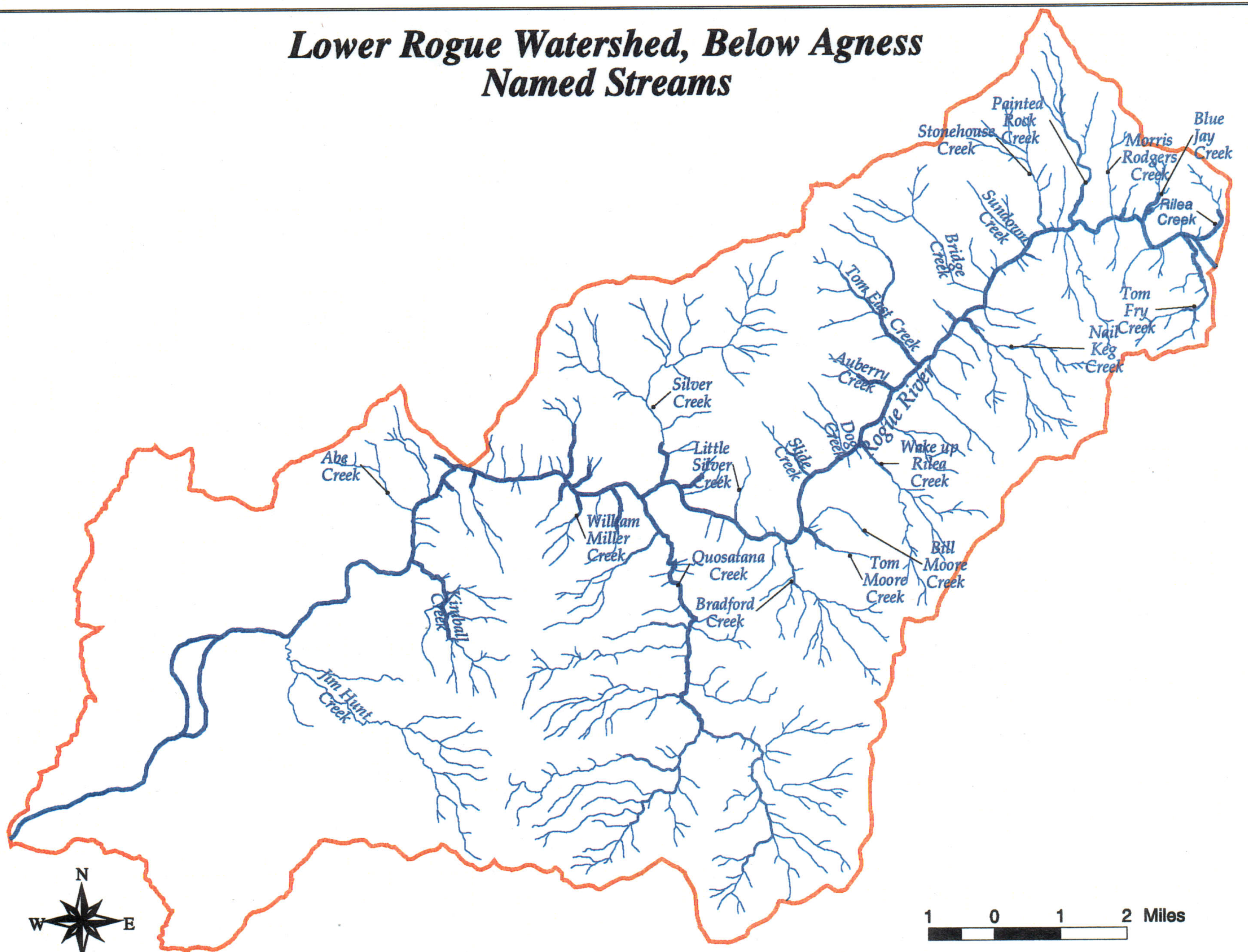
# Lower Rogue Watershed Below Agness Site Map



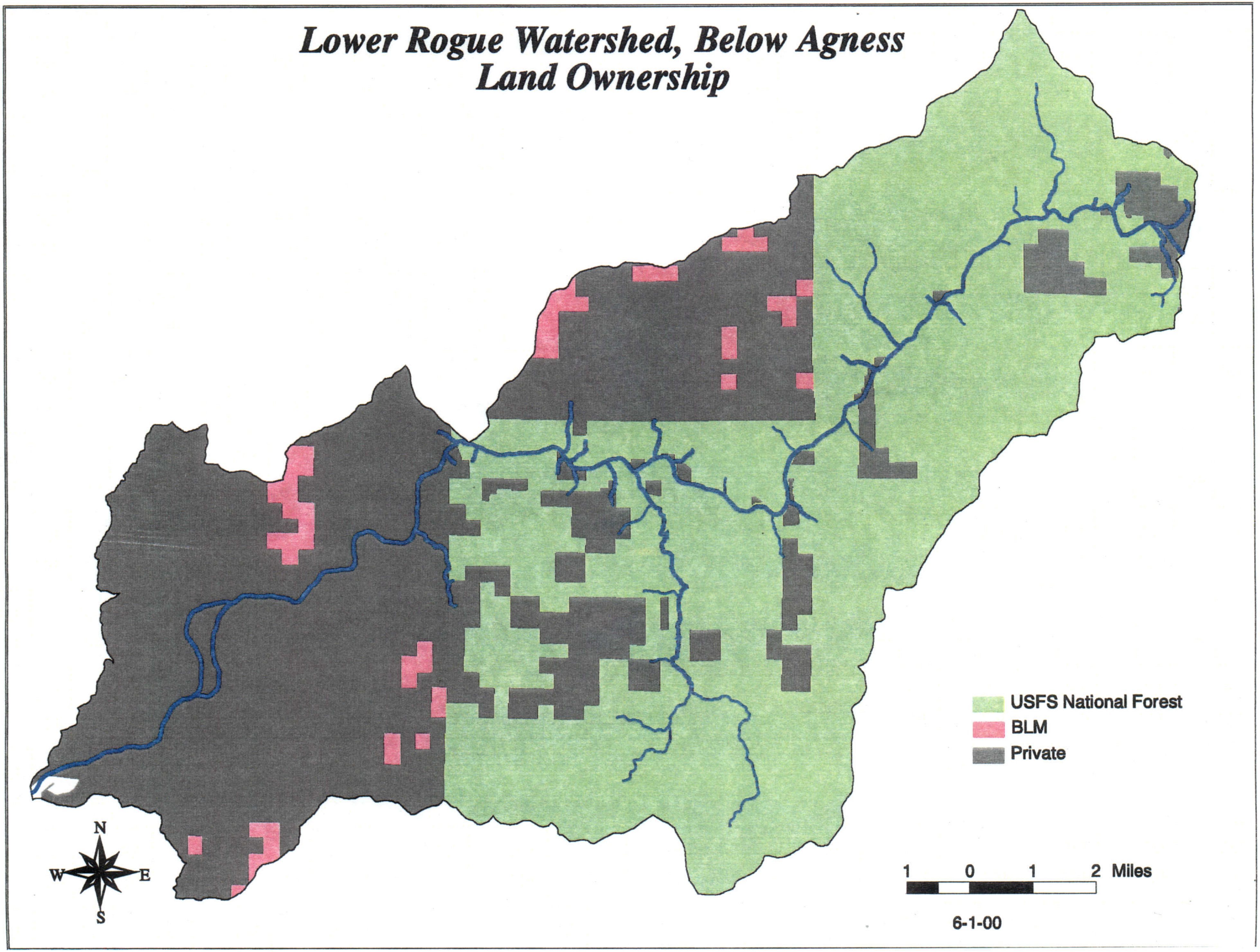

Map 2

Map 3

# Lower Rogue Watershed, Below Agness
## Named Streams

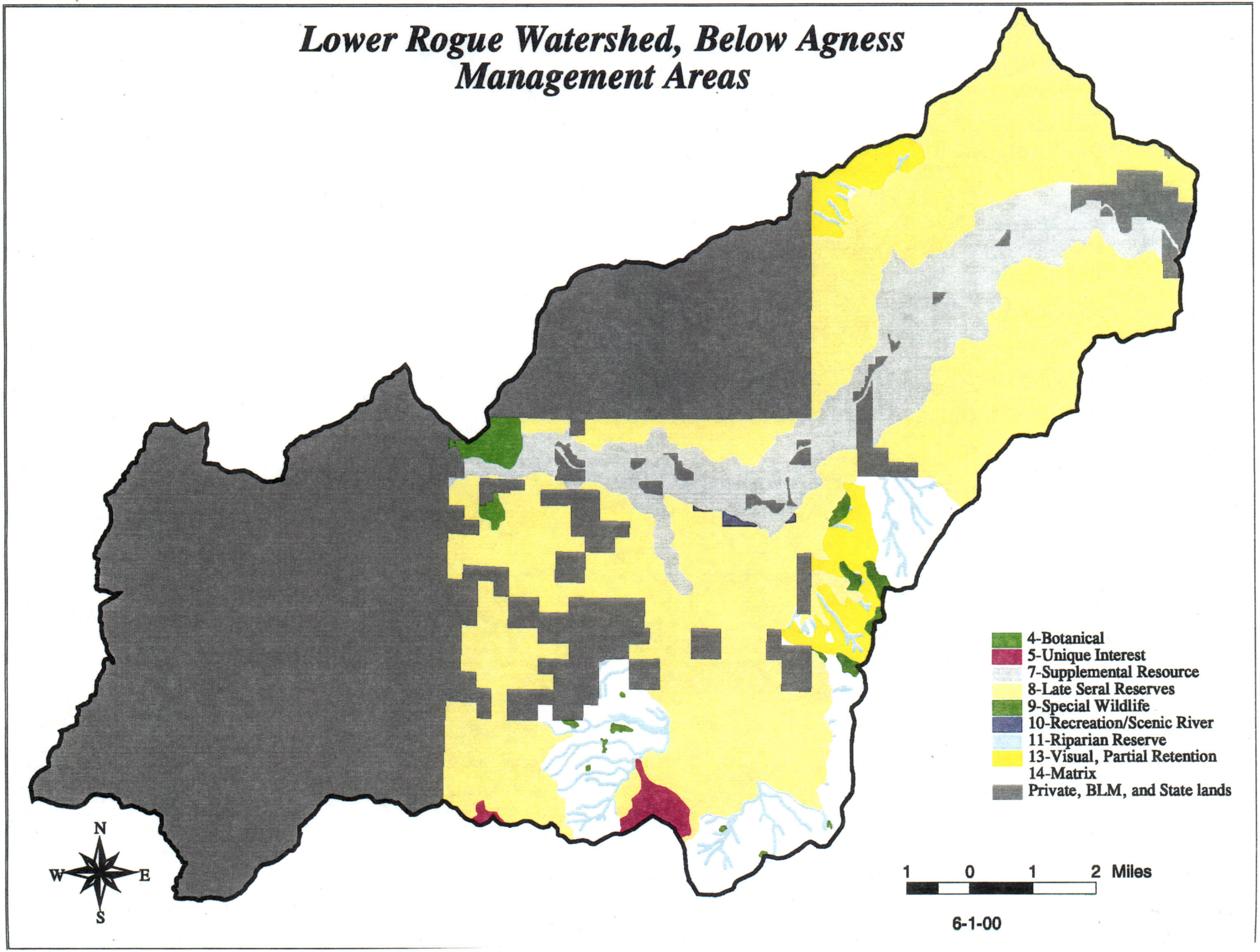



6-1-00



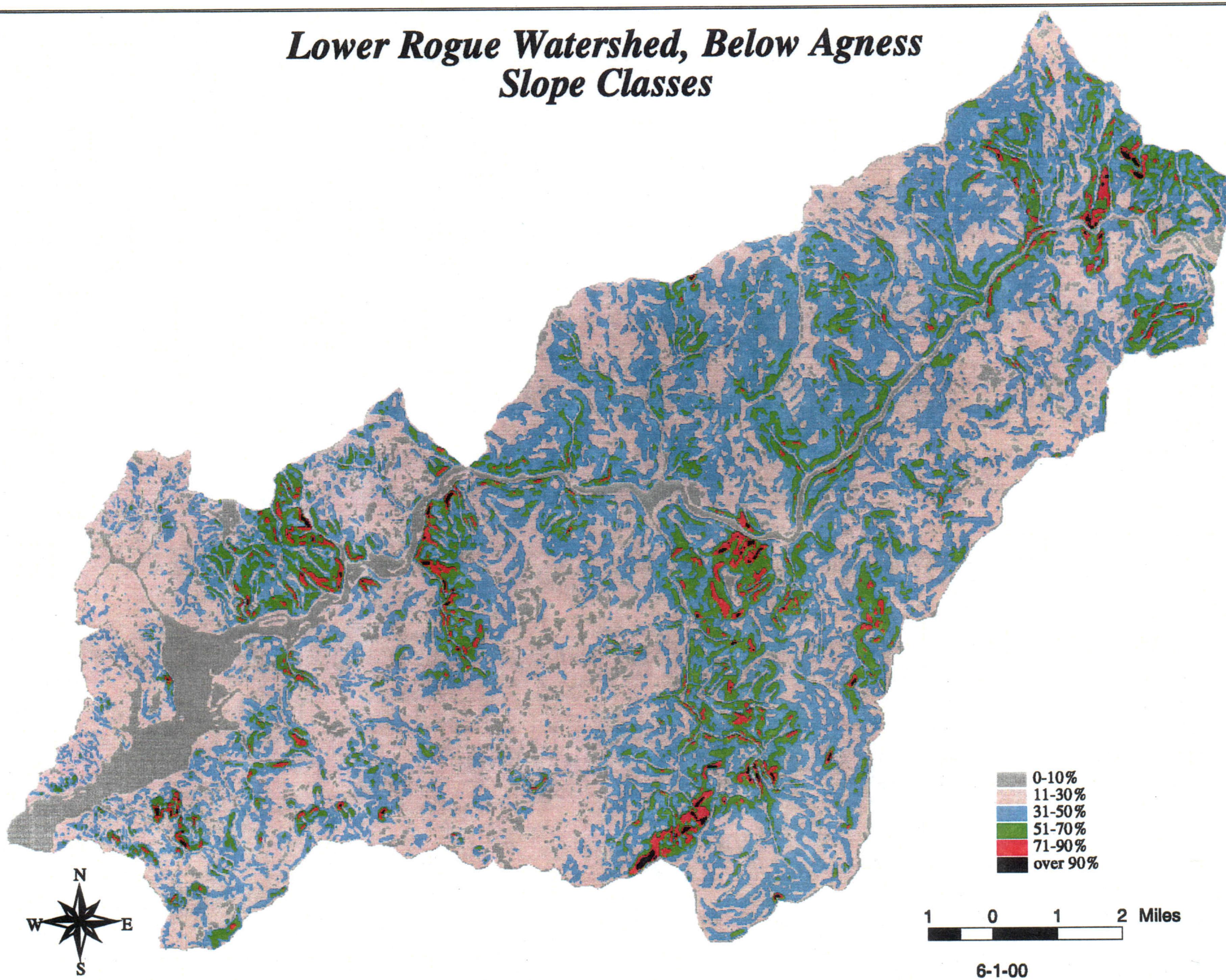
Lower Rogue Watershed, Below Agness
Land Ownership
USFS National Forest
BLM
Private
N
S
E
W
1 0 1 2 Miles
6-1-00

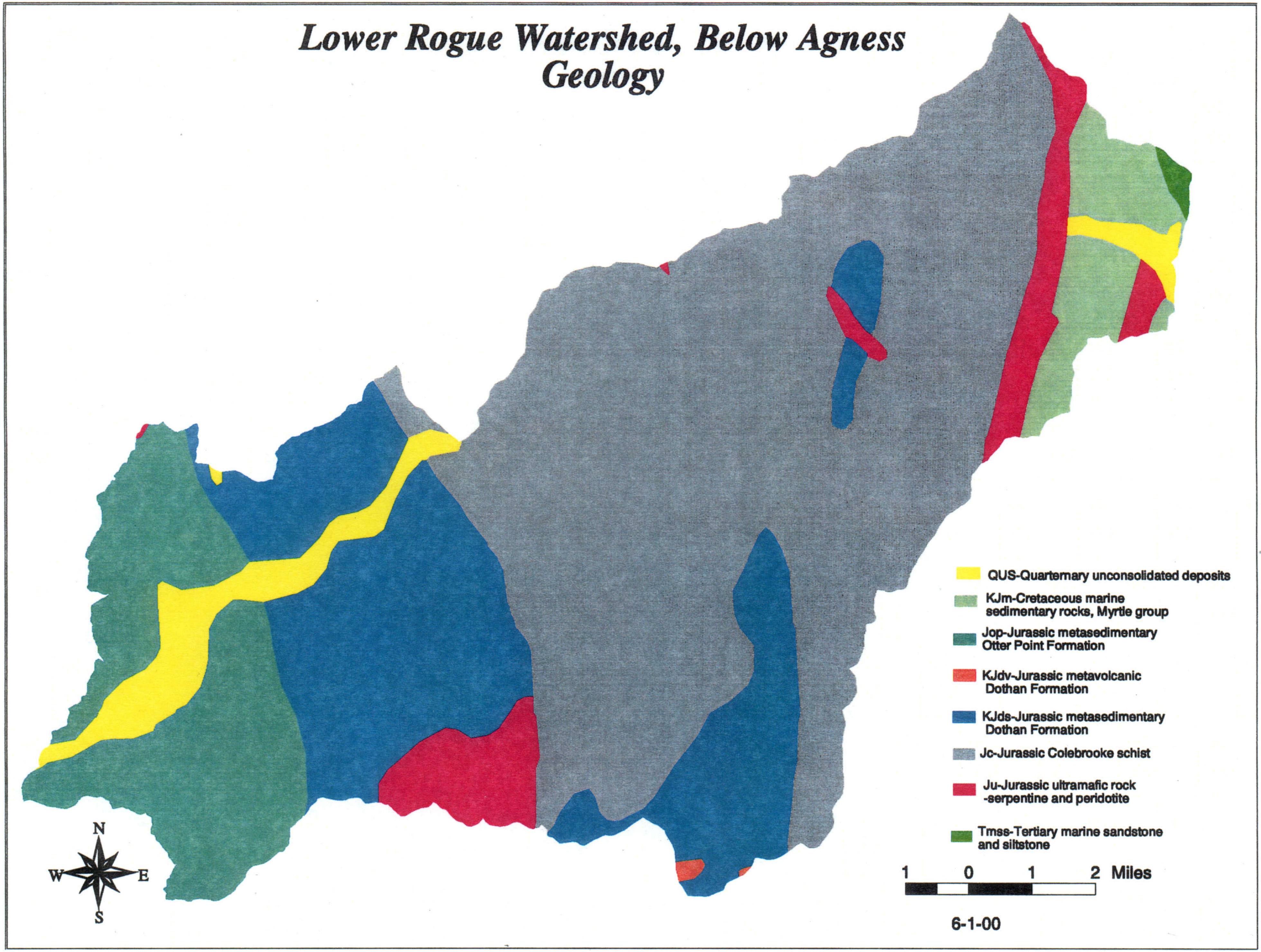

Map 4


Lower Rogue Watershed, Below Agness
Management Areas
4-Botanical
5-Unique Interest
7-Supplemental Resource
8-Late Seral Reserves
9-Special Wildlife
10-Recreation/Scenic River
11-Riparian Reserve
13-Visual, Partial Retention
14-Matrix
Private, BLM, and State lands
N
W
E
S
1
0
1
2
Miles
6-1-00

Map 6

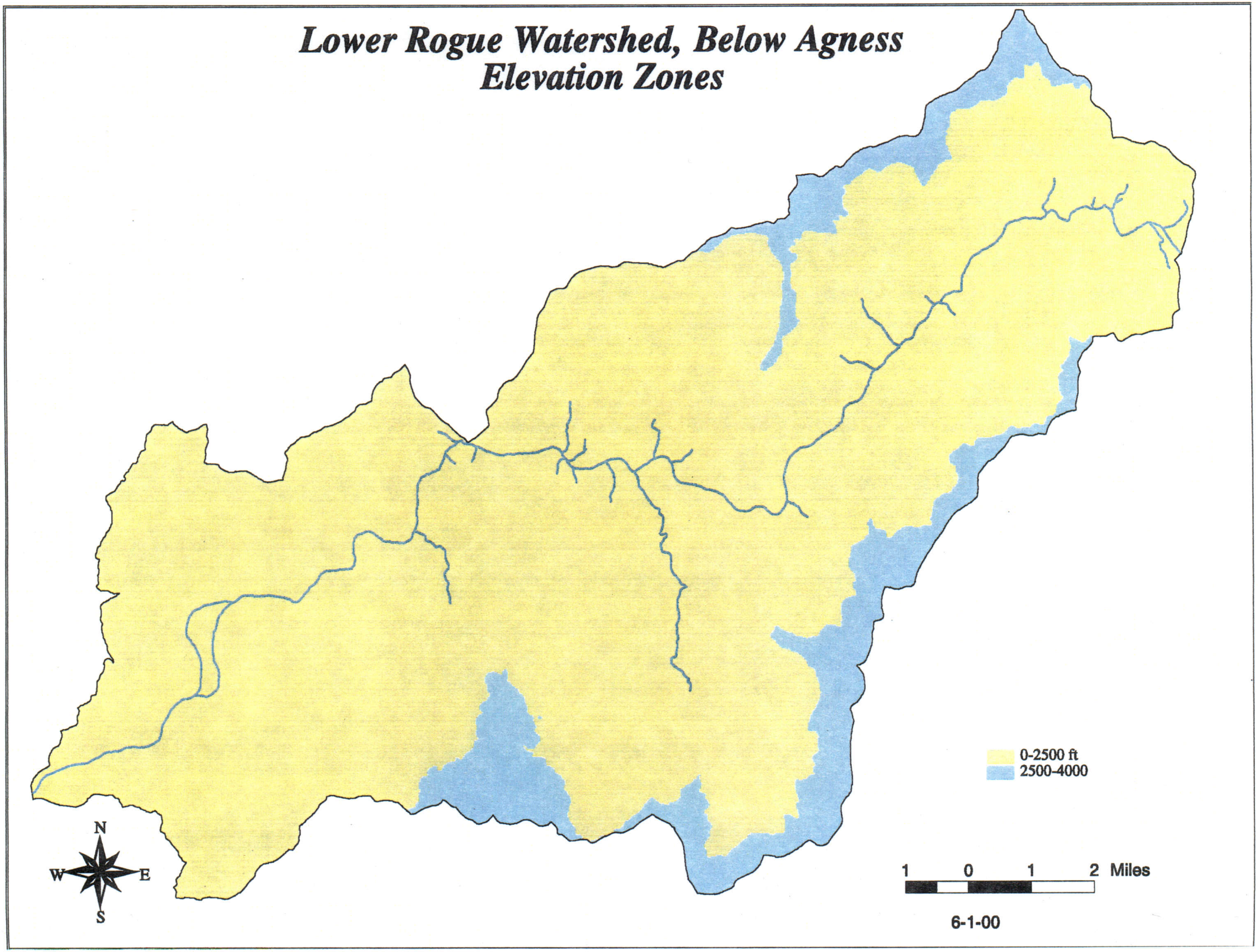
# *Lower Rogue Watershed, Below Agness*
## *Slope Classes*

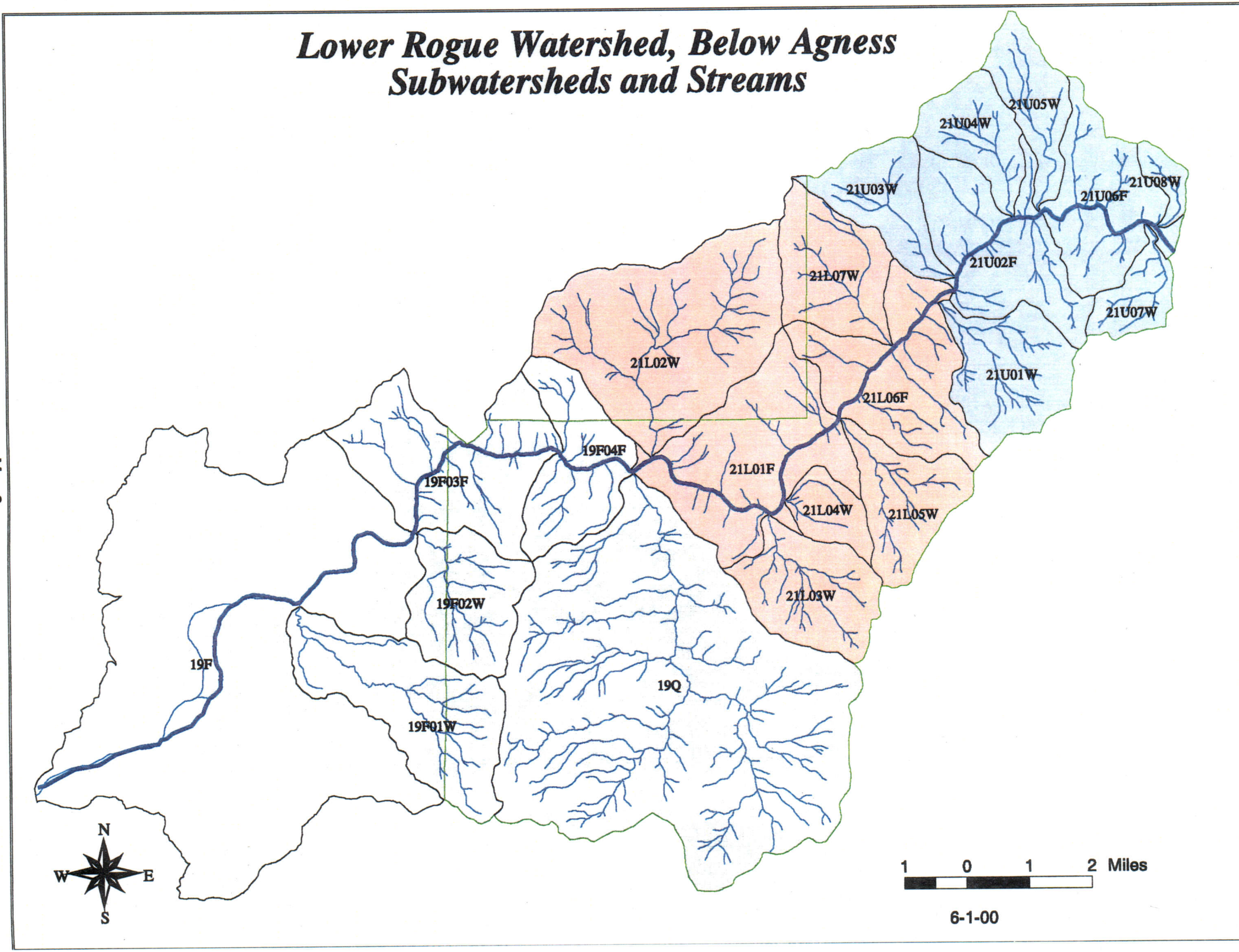



Lower Rogue Watershed, Below Agness
Geology
QUS-Quarternary unconsolidated deposits
KJm-Cretaceous marine sedimentary rocks, Myrtle group
Jop-Jurassic metasedimentary Otter Point Formation
KJdv-Jurassic metavolcanic Dothan Formation
KJds-Jurassic metasedimentary Dothan Formation
Jc-Jurassic Colebrooke schist
Ju-Jurassic ultramafic rock -serpentine and peridotite
Tmss-Tertiary marine sandstone and siltstone
N
W
E
S
1 0 1 2 Miles
6-1-00

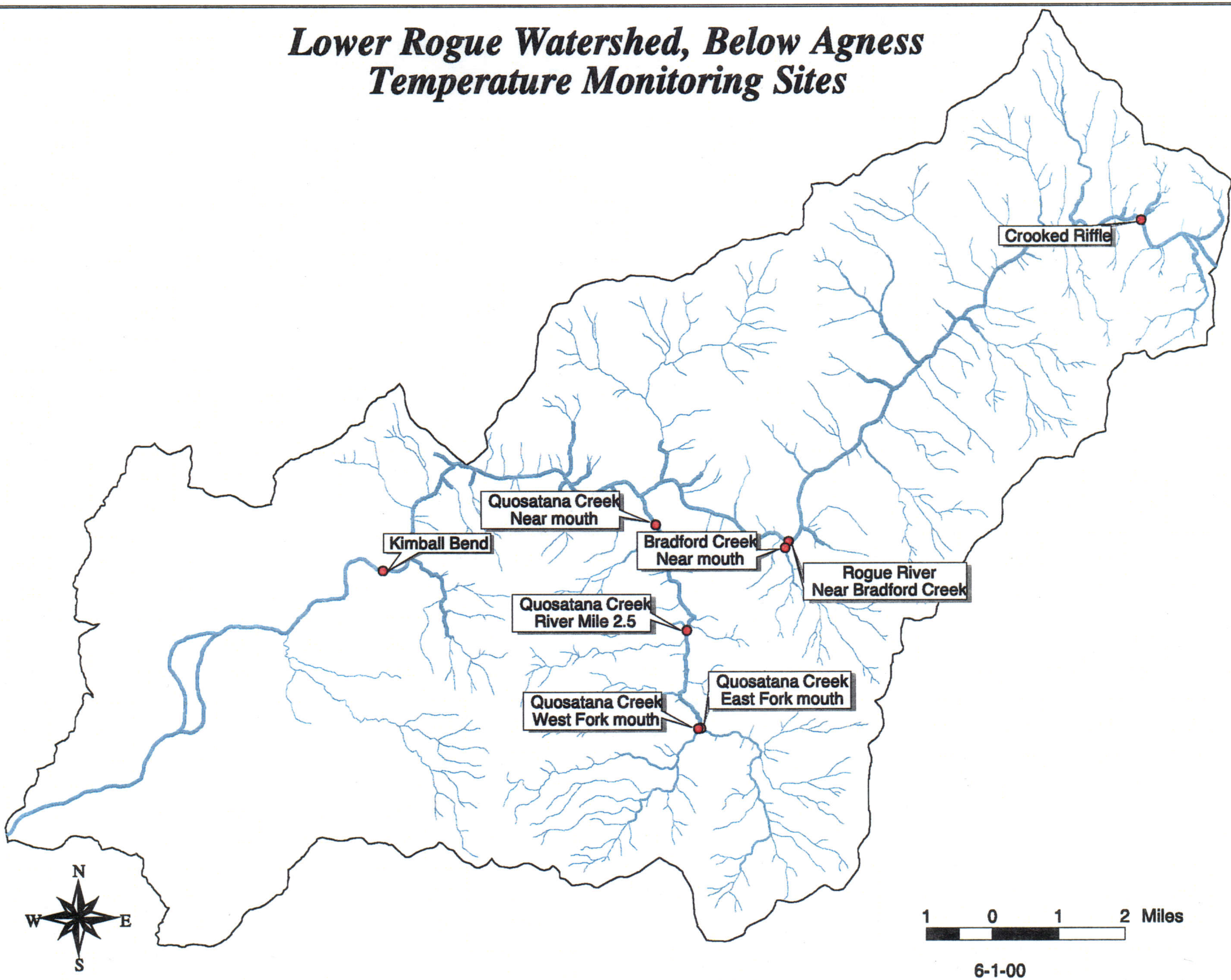
Map 7

Map 8


Lower Rogue Watershed, Below Agness
Elevation Zones
0-2500 ft
2500-4000
N
S
W
E
1 0 1 2 Miles
6-1-00

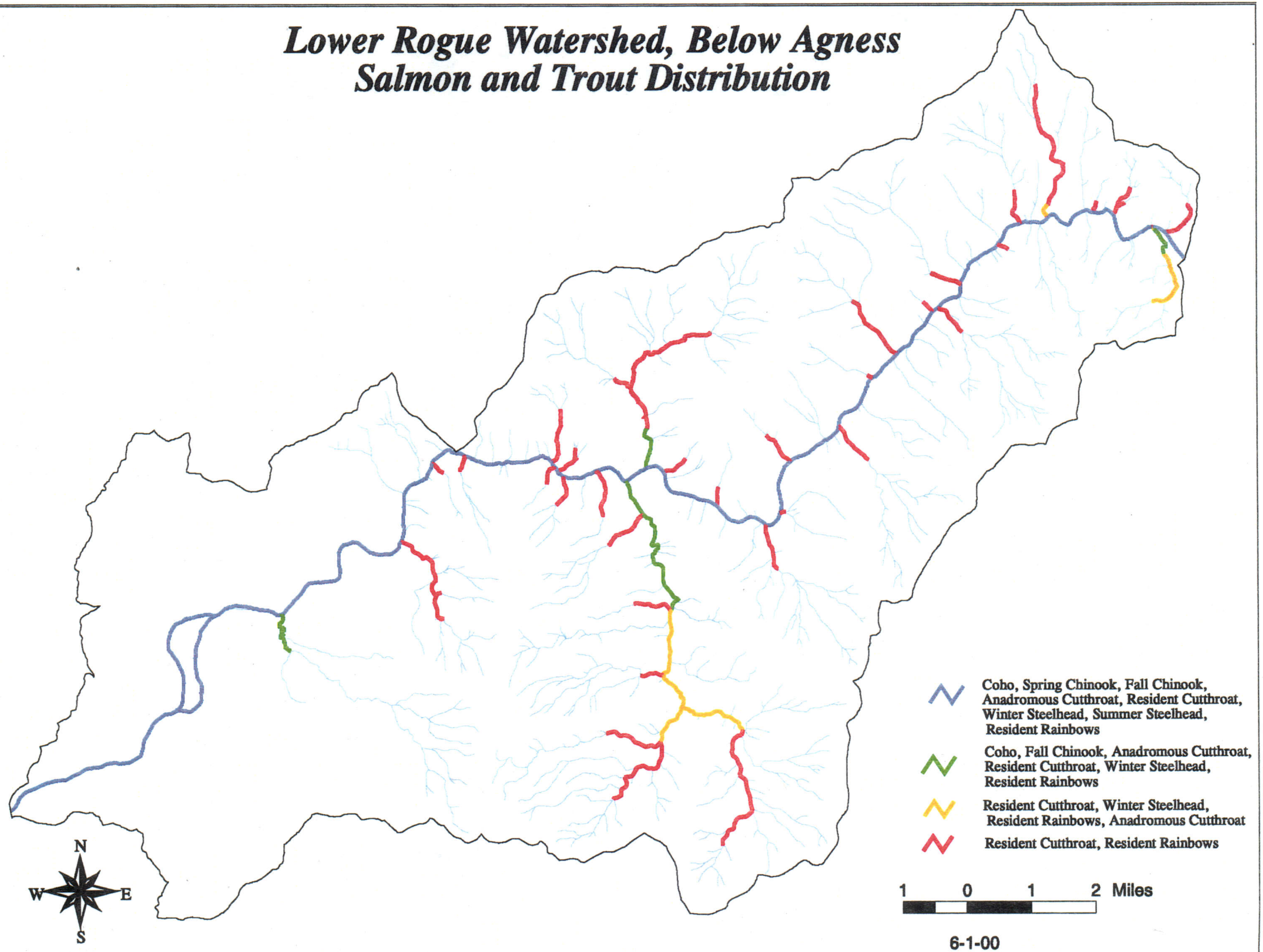

Lower Rogue Watershed, Below Agness
Subwatersheds and Streams
21U05W
21U04W
21U08W
21U03W
21U06F
21U02F
21L07W
21U07W
21L02W
21U01W
21L06F
19F04F
21L01F
19F03F
21L04W
21L05W
21L03W
19F02W
19F
19Q
19F01W
N
W
E
S
1
0
1
2
Miles
6-1-00
Map 9

# Lower Rogue Watershed, Below Agness Temperature Monitoring Sites




Map 10

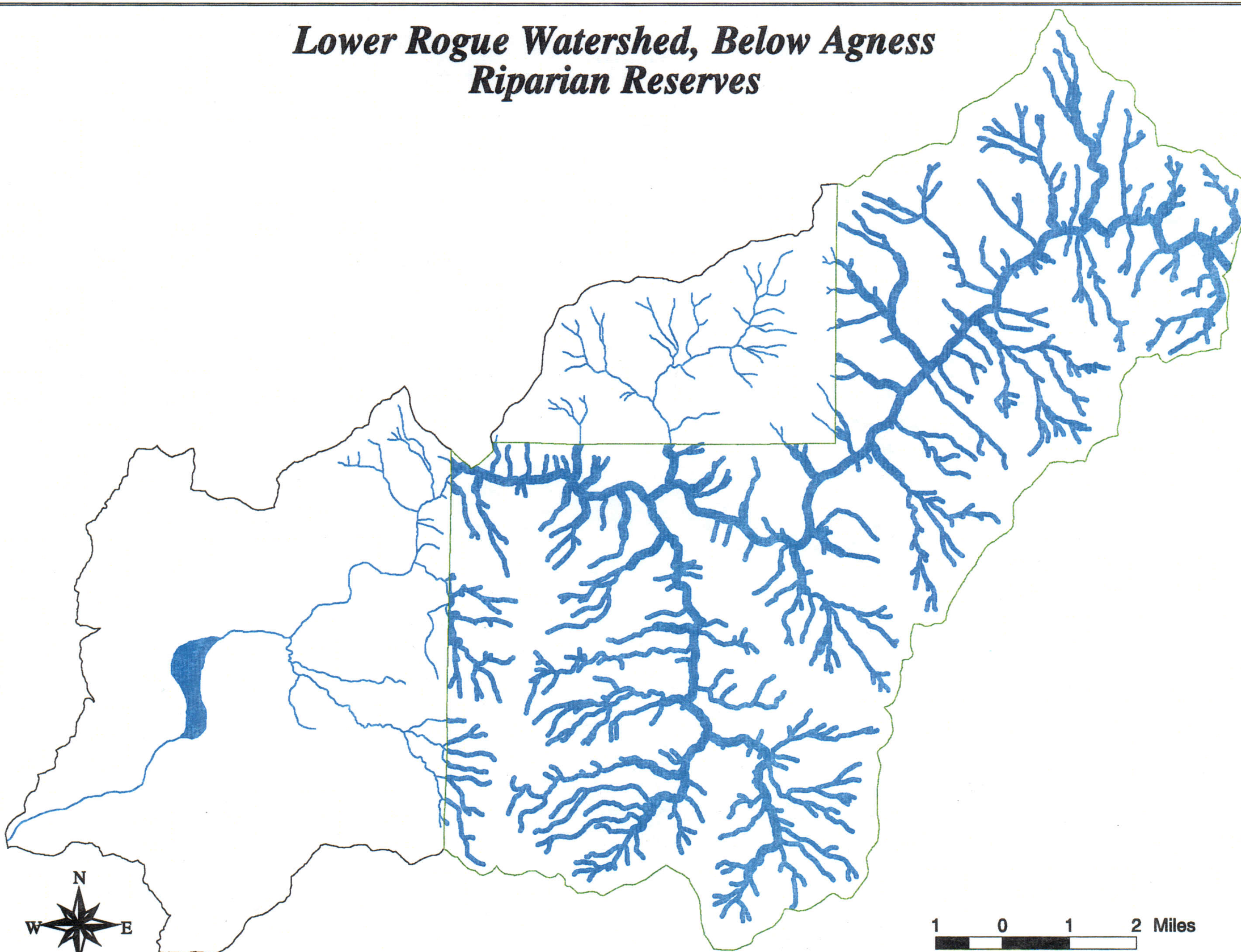
# Lower Rogue Watershed, Below Agness
## Salmon and Trout Distribution




6-1-00

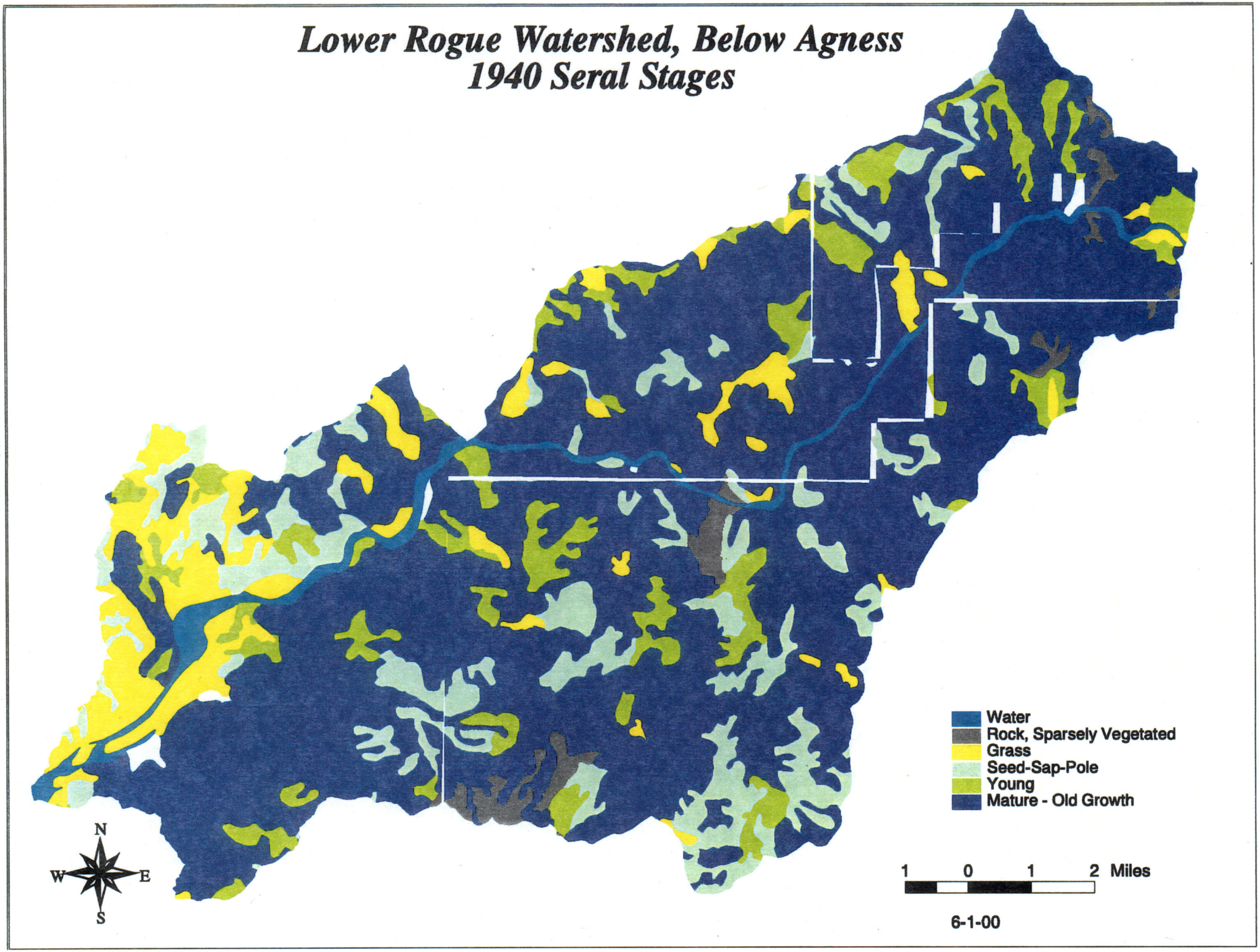
Map 12

# Lower Rogue Watershed, Below Agness
## Riparian Reserves

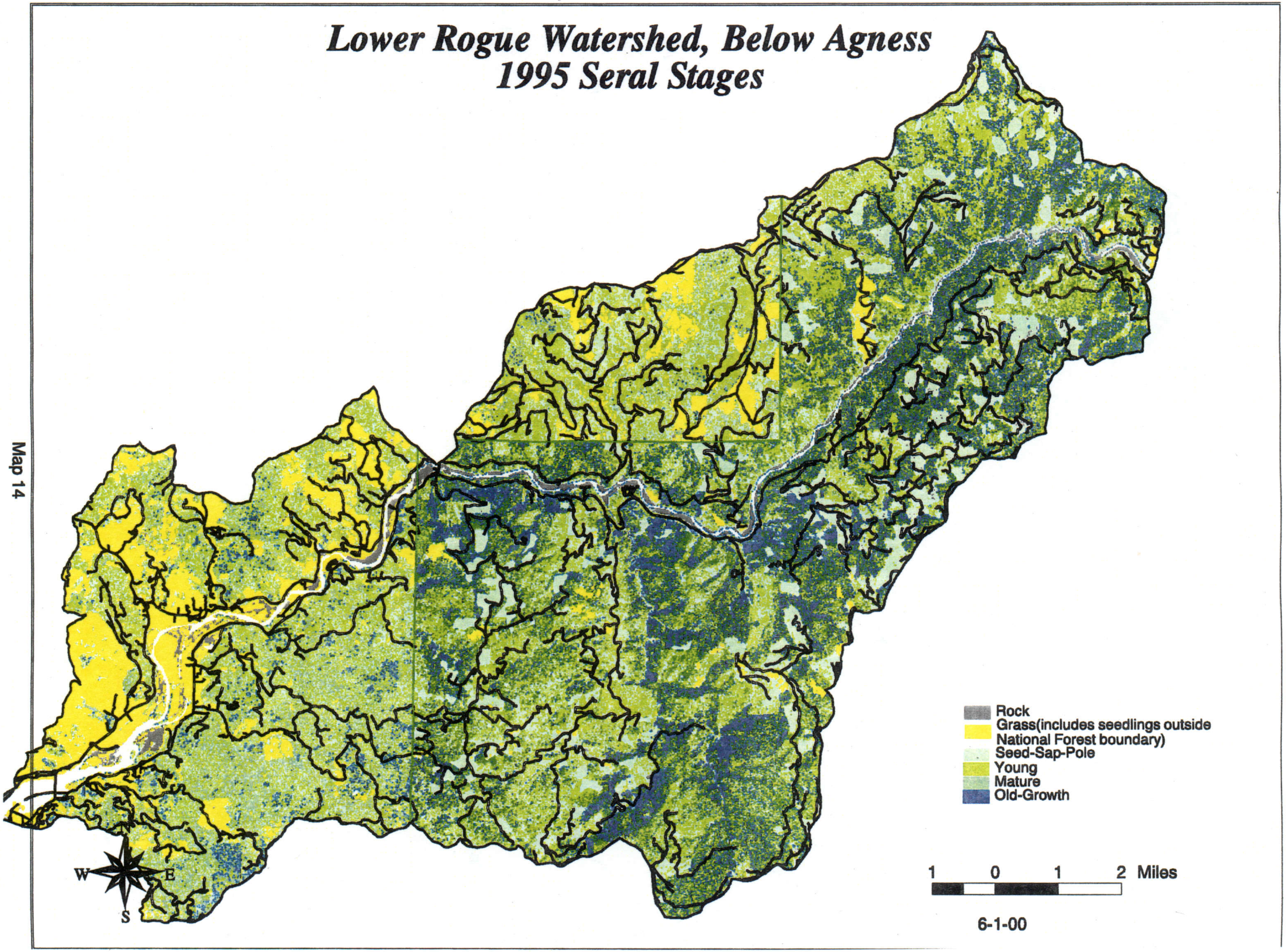



6-1-00

Map 13

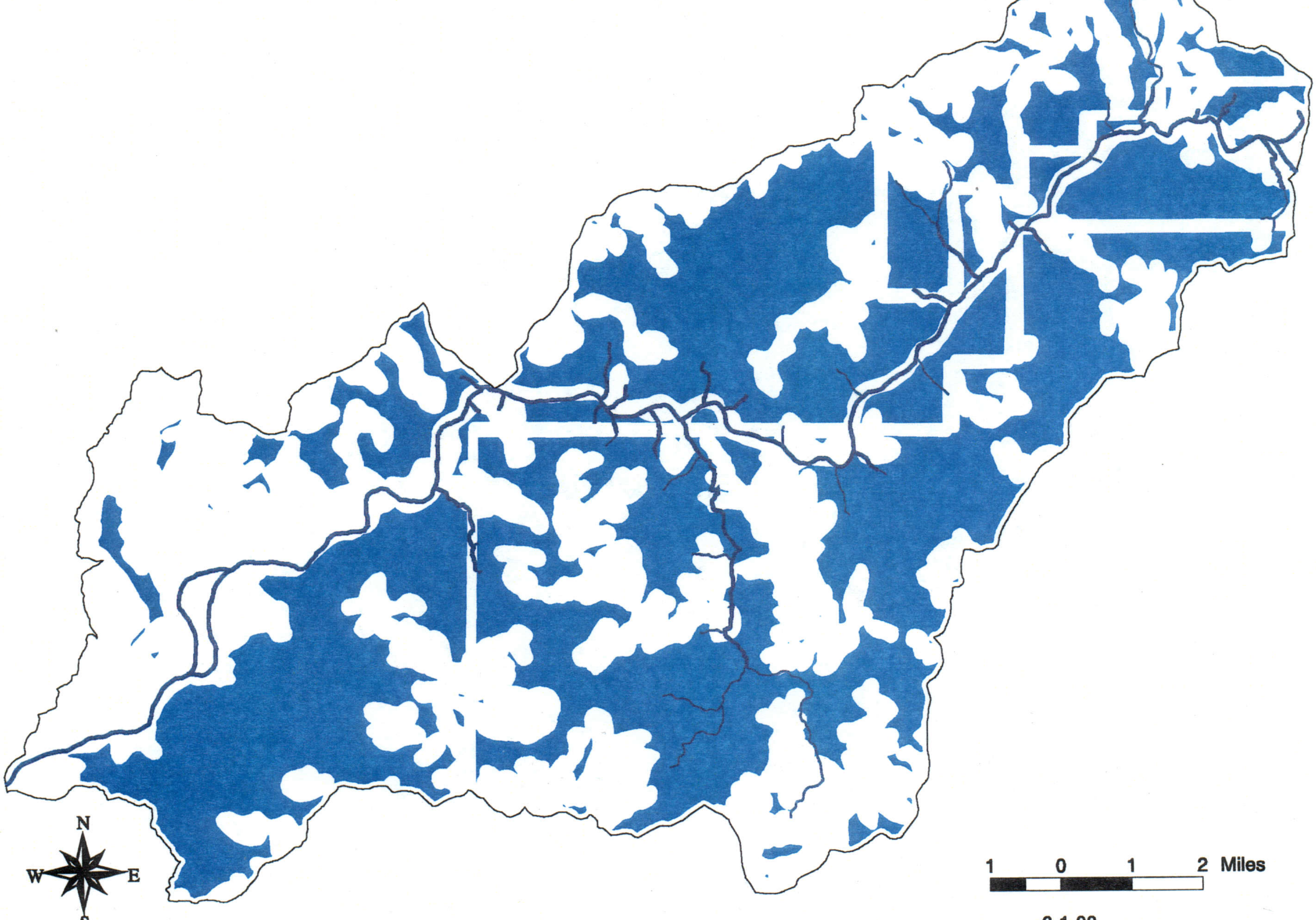

Lower Rogue Watershed, Below Agness
1940 Seral Stages
Water
Rock, Sparsely Vegetated
Grass
Seed-Sap-Pole
Young
Mature - Old Growth
N
W
E
S
1 0 1 2 Miles
6-1-00

Map 14


Lower Rogue Watershed, Below Agness
1995 Seral Stages
Rock
Grass(includes seedlings outside
National Forest boundary)
Seed-Sap-Pole
Young
Mature
Old-Growth
W
E
S
1 0 1 2 Miles
6-1-00

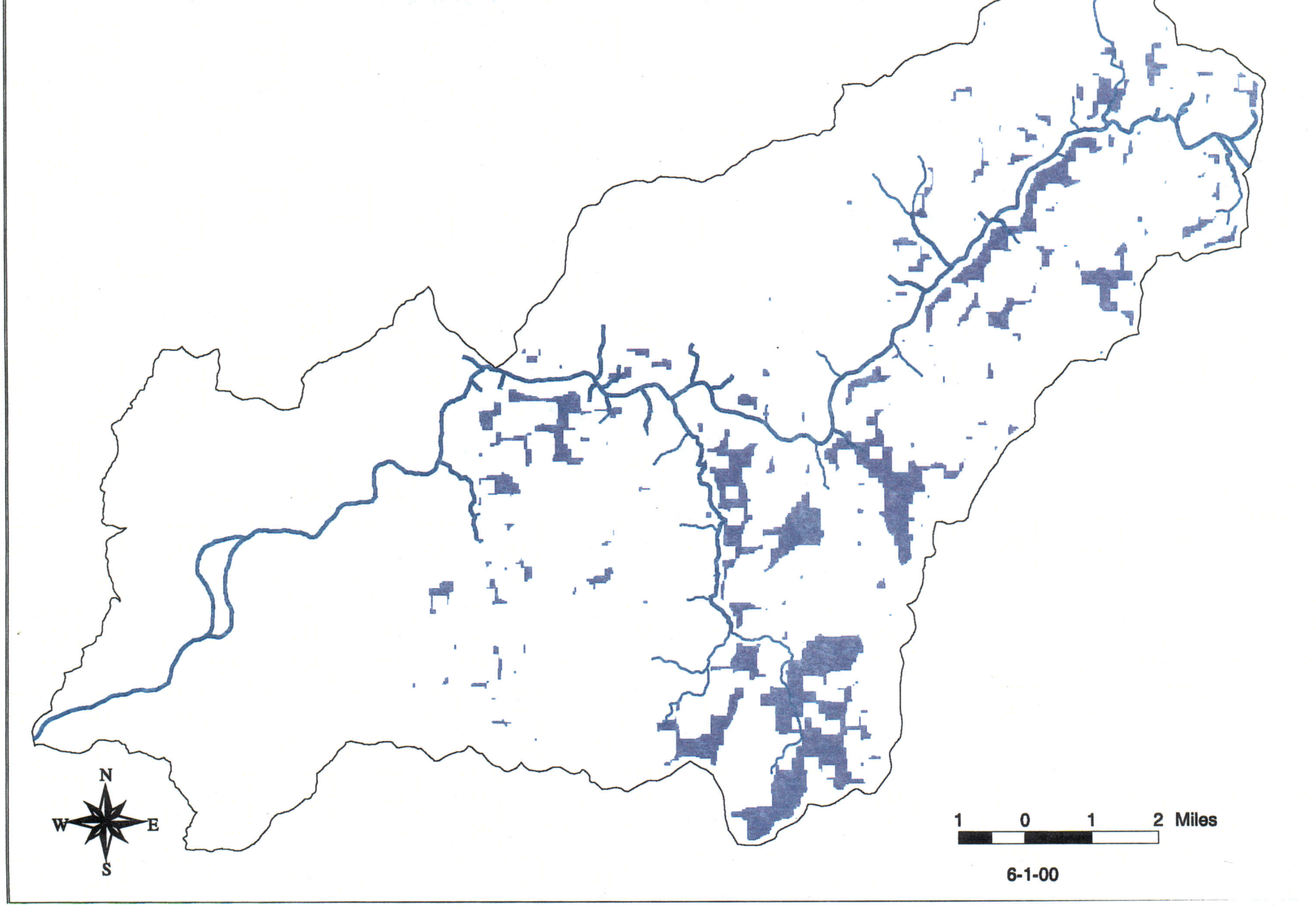
Map 15

# Lower Rogue Watershed, Below Agness
# 1940 Interior Late-Successional Habitat

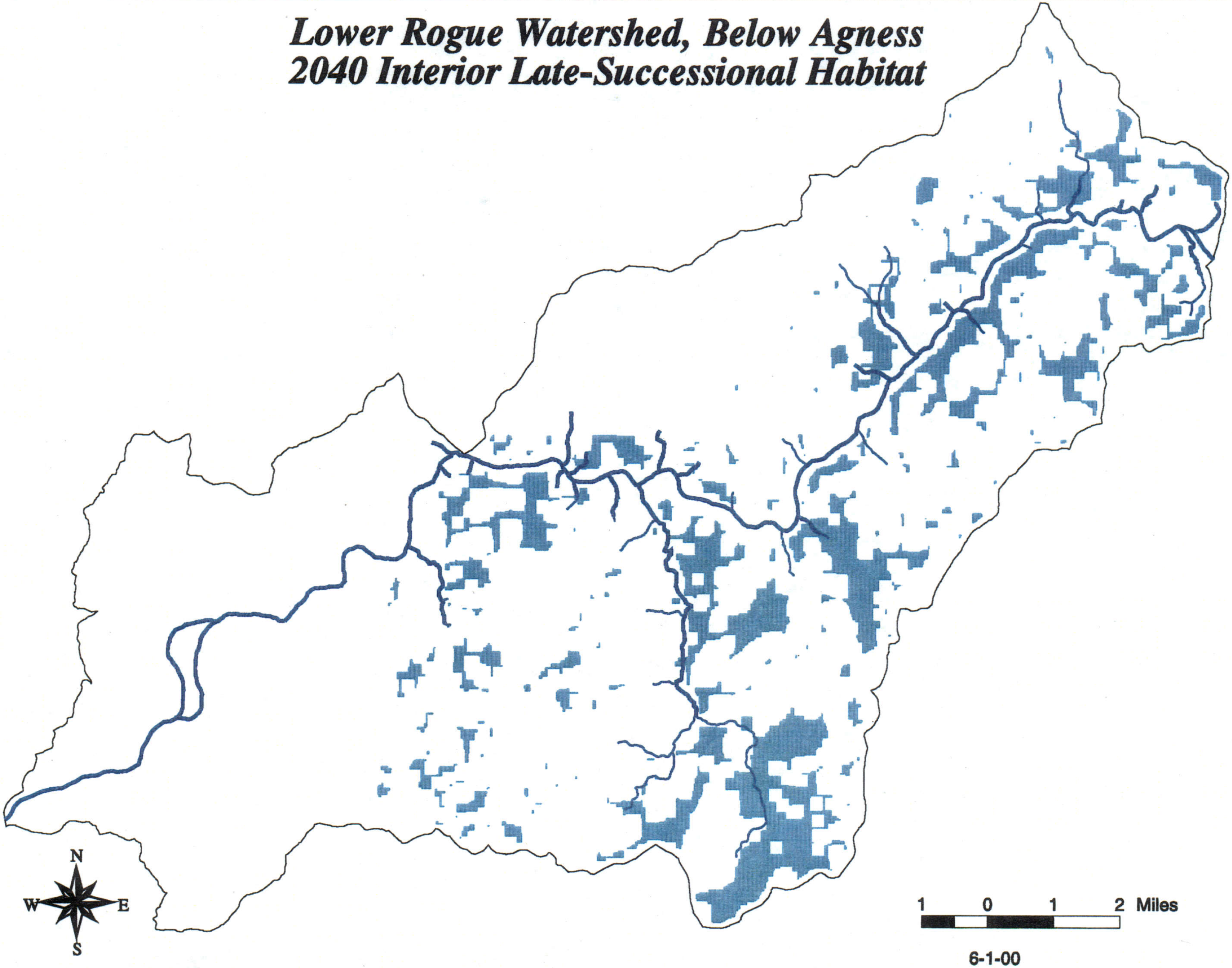


Map 16

# Lower Rogue Watershed, Below Agness
# 1995 Interior Late-Successional Habitat

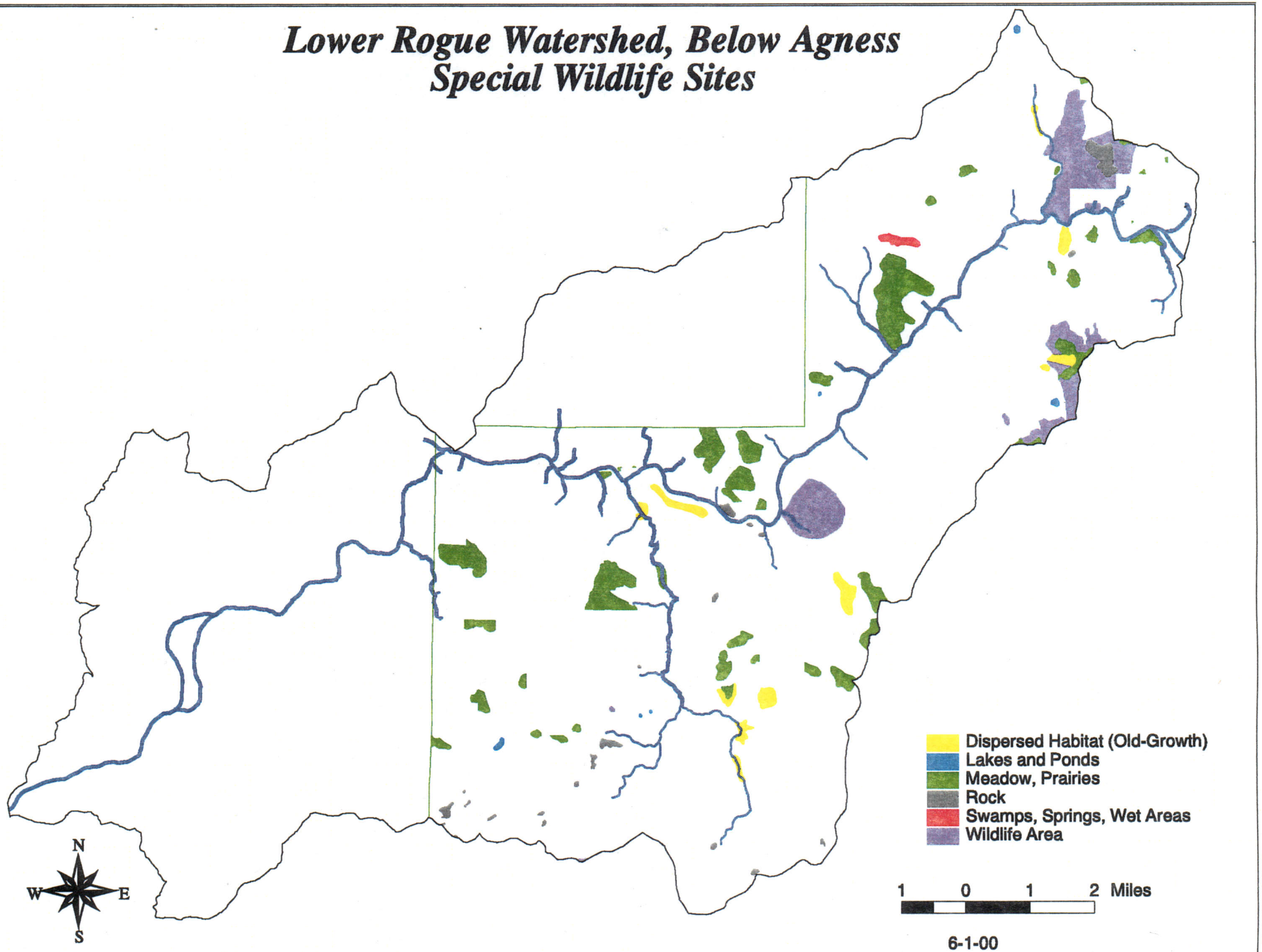


# Lower Rogue Watershed, Below Agness
# 2040 Interior Late-Successional Habitat



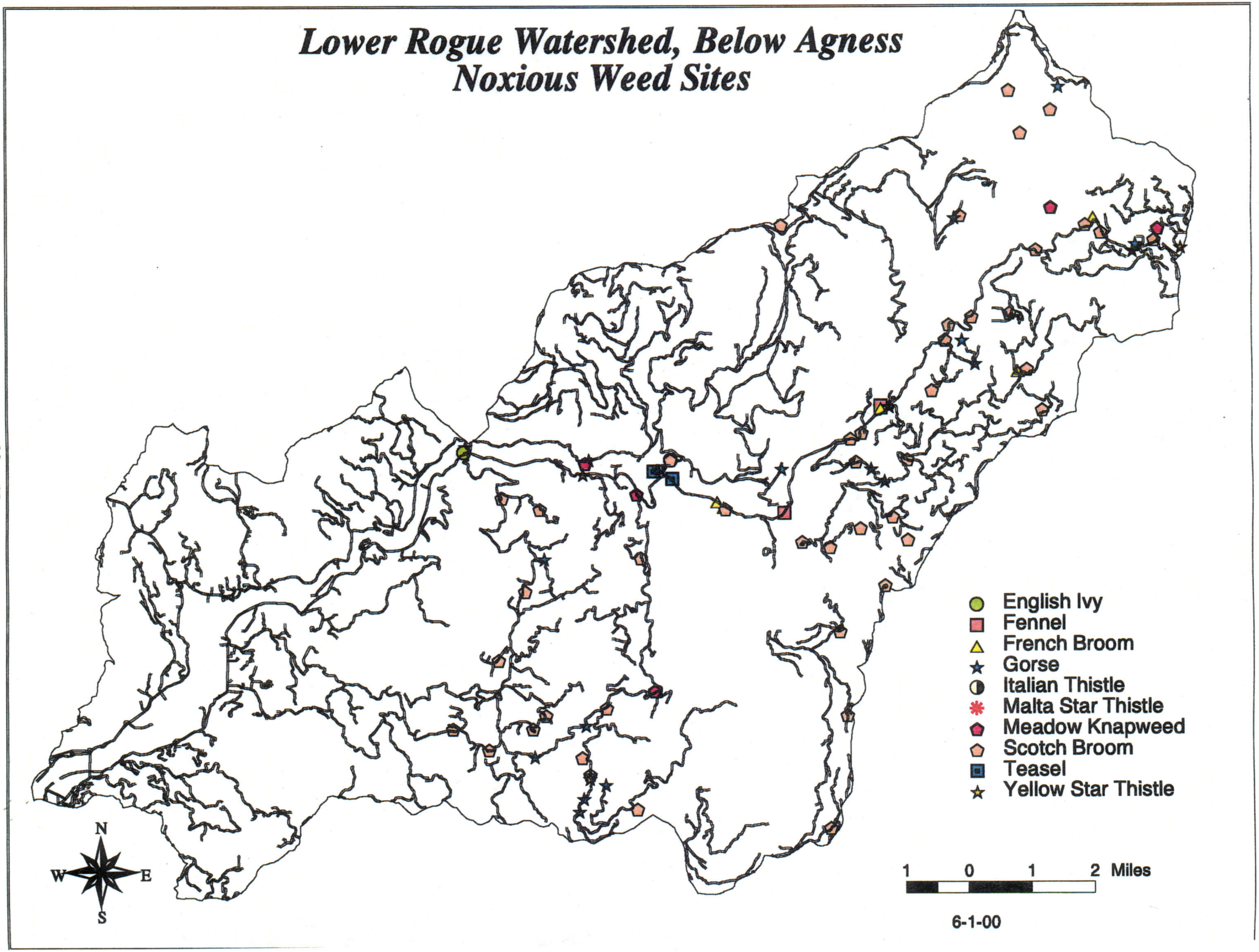

Map 17

# Lower Rogue Watershed, Below Agness
## Special Wildlife Sites

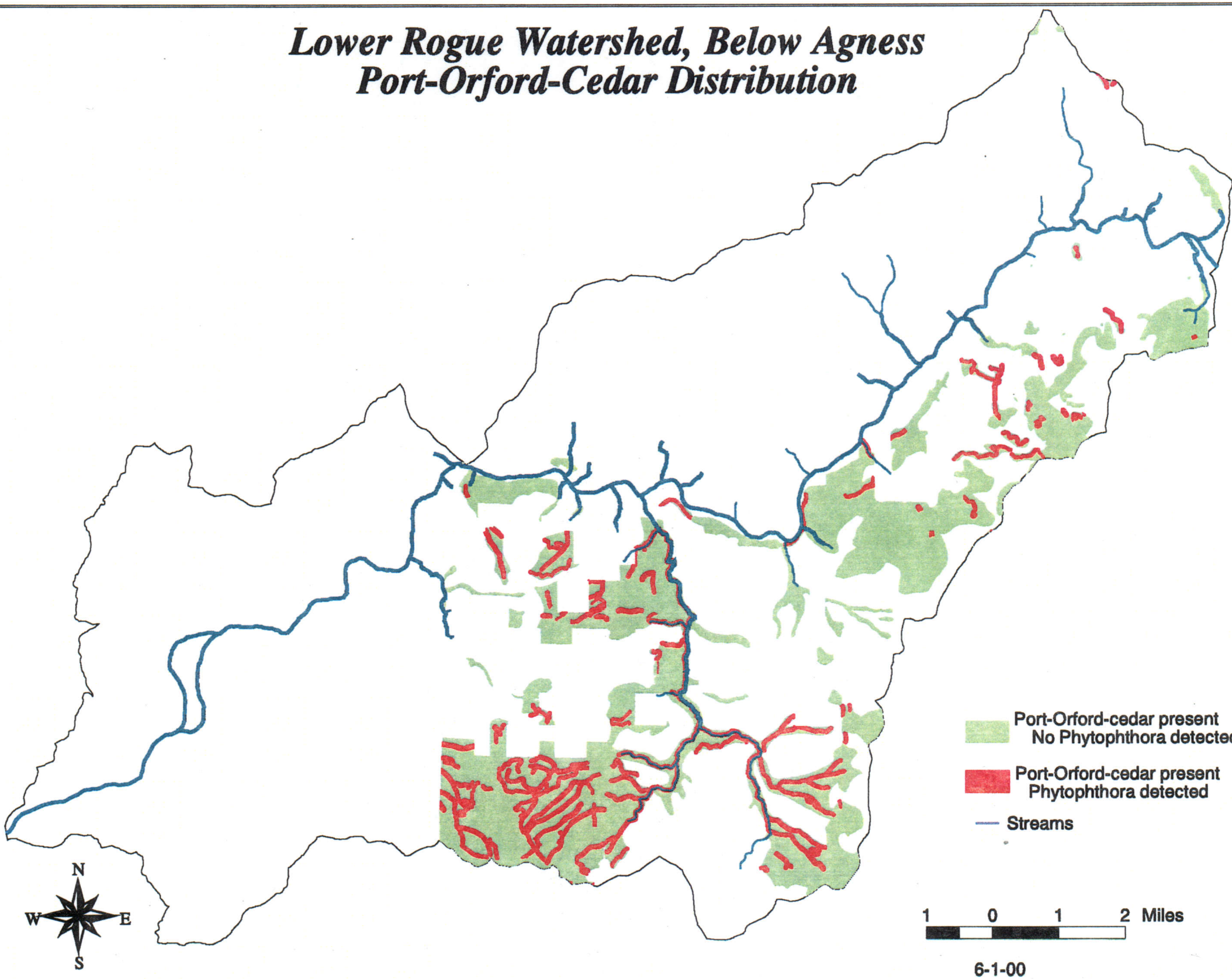



6-1-00

Map 18

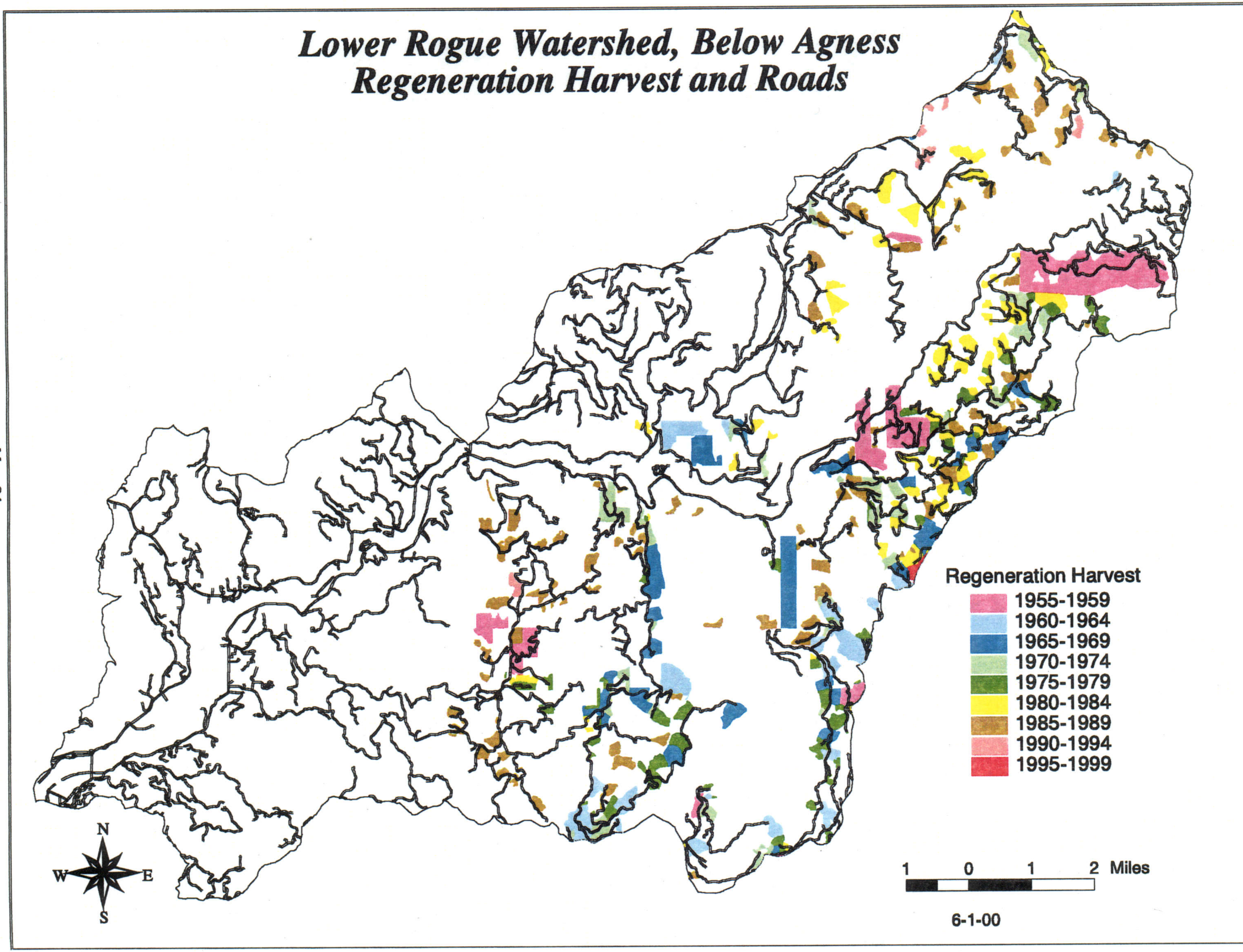

Lower Rogue Watershed, Below Agness
Noxious Weed Sites
English Ivy
Fennel
French Broom
Gorse
Italian Thistle
Malta Star Thistle
Meadow Knapweed
Scotch Broom
Teasel
Yellow Star Thistle
N
W
E
S
1 0 1 2 Miles
6-1-00

# *Lower Rogue Watershed, Below Agness*
# *Port-Orford-Cedar Distribution*

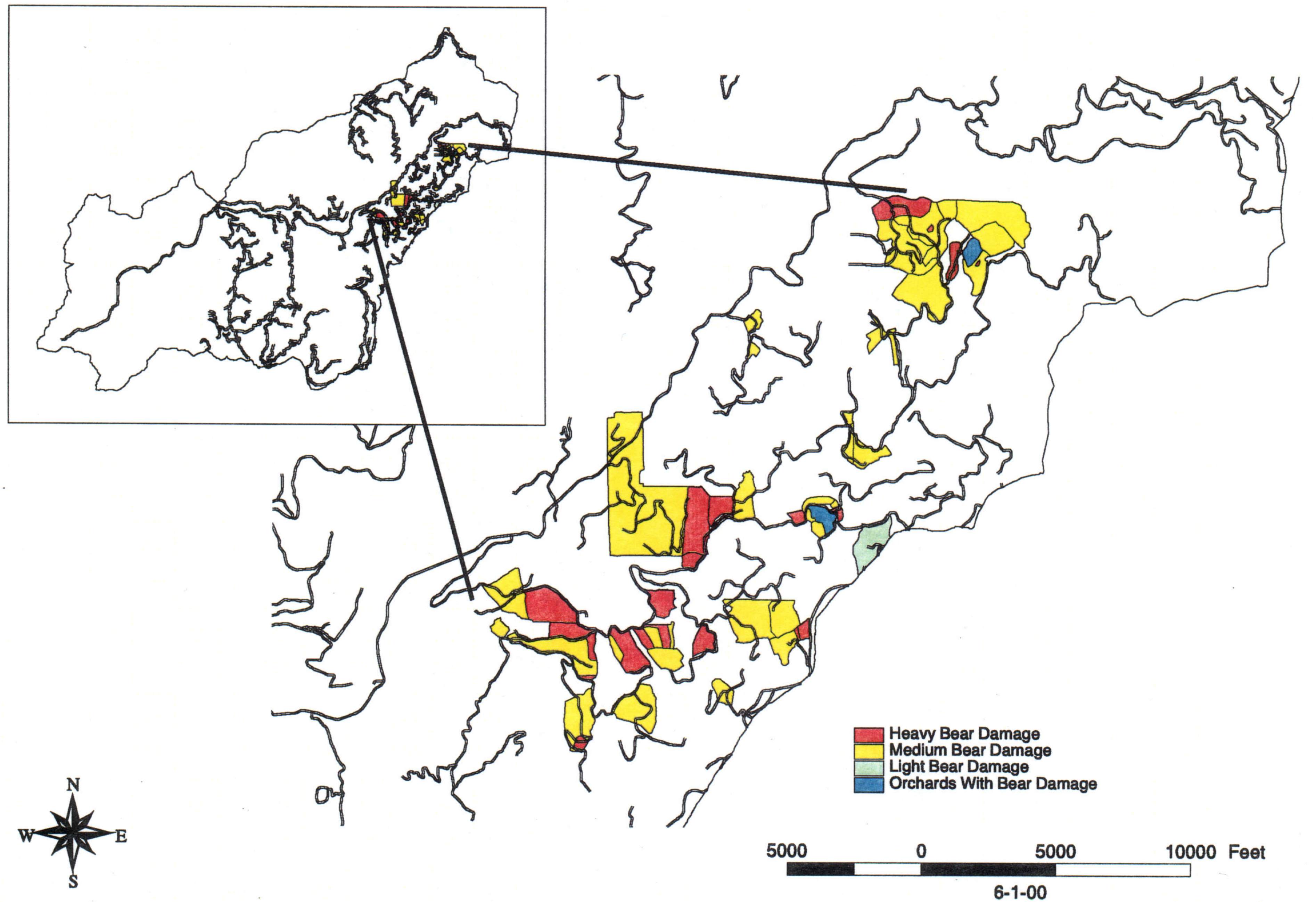



Map 20

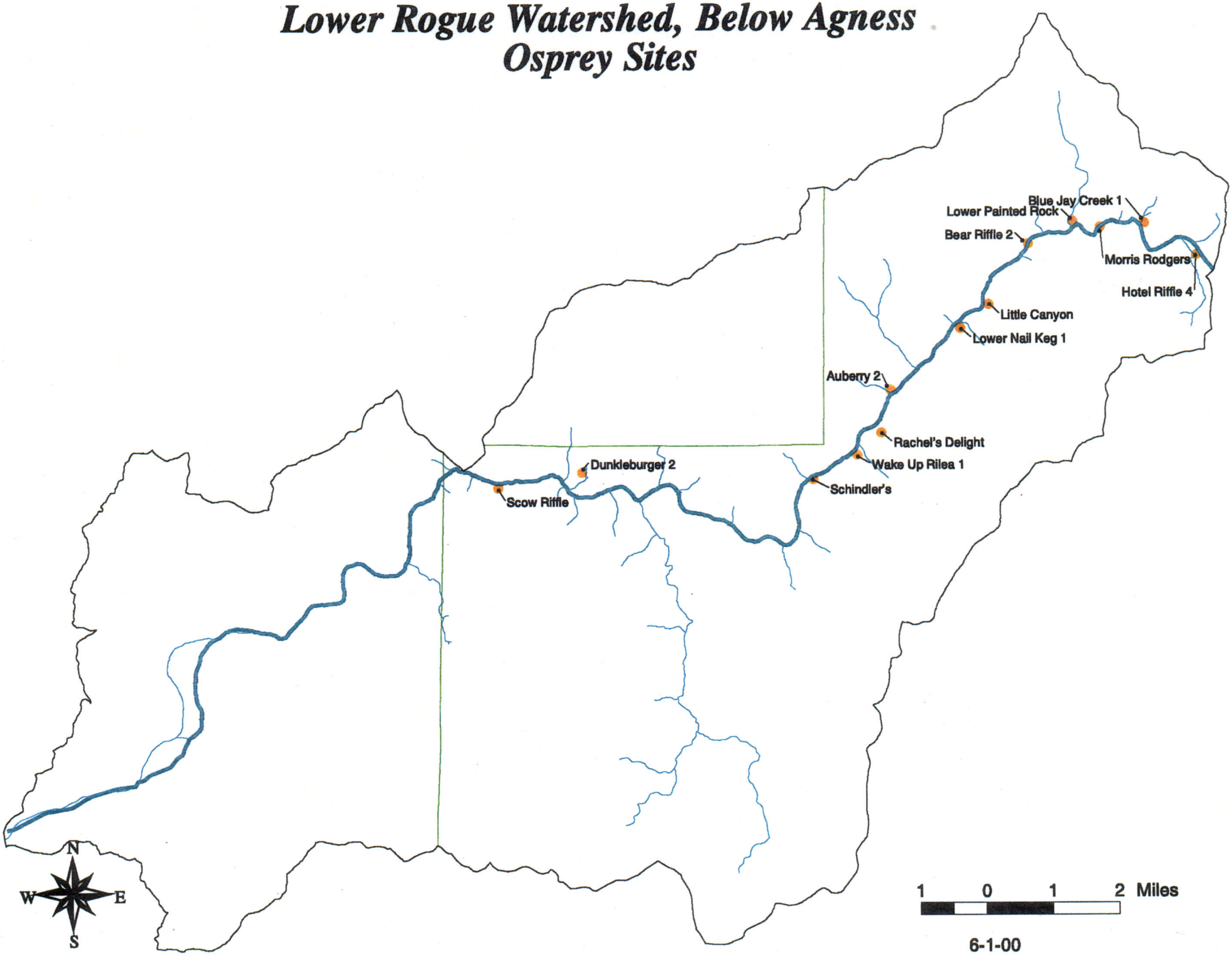
Map 21


Lower Rogue Watershed, Below Agness
Regeneration Harvest and Roads
Regeneration Harvest
1955-1959
1960-1964
1965-1969
1970-1974
1975-1979
1980-1984
1985-1989
1990-1994
1995-1999
N
S
W
E
1 0 1 2 Miles
6-1-00

# Lower Rogue Watershed, Below Agness
# Bear Damage



# Lower Rogue Watershed, Below Agness
# Osprey Sites




Map 23

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# APPENDIX A

***Personal Interviews – Grazing***

***Tom Hawkins Interview on March 17, 2000***

Tom's Great grandfather, William Miller, had a large garden on Miller Bar where he grew vegetables and trucked them to town. Tom's grandfather, Eldon Miller, did lots of hunting in the area. The Millers were related to the Millers that grazed at Miller Ranch. Historically, everywhere in Curry County that there were meadows, there was grazing.

Talk to Gene Brock (he works for Coos Forest Protection). He used to run cattle up trail from Half Moon Bar to Bear Camp pastures.

Talk to Wayne Adams about grazing around Adams Prairie. His family used to own the prairie. They used to run up to 200 hogs down the lower Rogue River Trail.

Lowry Place has had cattle; they used to run up to Skookumhouse Prairie.

Johnny Moore and Tom Morgan (both deceased now) ran cattle in lower (privately owned) portions of Euchre Creek.

Talk to Ken Hensley, his brother used to have a grazing allotment and ran cattle.

The Miller Ranch has had livestock. Warney (spelling) and Teem Miller grazed the Miller Ranch. Talk to Mike Miller (unrelated) about the grazing there. He used to live on the ranch.

Jack Leith runs Black Angus cattle up Hunter Creek. Scott Knox runs Hereford cattle up Signal Buttes and off into Hunter Creek sometimes.

***Wayne Adams Interview on March 17, 2000***

I asked Wayne for information on Historical Grazing for the lower Rogue River watershed analysis.

The Adams Ranch was owned by George Richard "Dick" Adams from 1910 through 1947, when he sold it to his son, Jack Adams (Wayne Adams' father). The Ranch was later sold to Champion Timber Company, who in turn traded it to the Forest Service in the early 1960s

The Adams' raised cattle, horses, sheep, goats and hogs on the ranch and surrounding country. The family also owned half of Skookumhouse Prairie, Soldier Camp Prairie, and Second Prairie (also known as Rock Prairie). Cattle grazed all of these prairies as well as the surrounding forested lands. The Adams' usually ran about 60 head of cattle from 1910 to 1960. The cattle were run down to the Miller Ranch were they were transported to market. The sheep mostly grazed Skookumhouse Prairie and secondarily at Adams Prairie. The goats stayed primarily on Adams Prairie The family used raised horses and used them as work animals on the ranch When Jack Adams purchased the ranch from his father in 1947, the family sold off the goats and sheep Jack bought a tractor in 1948 when Wayne was 4 years old. The workhorses were still used after they bought the tractor, but to a lesser extent. The hogs were set out after weaning to run the country and fatten up on the falling acorns. Every year, in late winter or early spring, about 200 hogs were rounded up and either barged down the river on Fred Lowry's barge, or run down the Lower Rogue River trail and sent to market. In 1956 a road was built to the ranch and after that the hogs and cattle were transported out of the ranch by pickup truck.

***Joe Genre (retired Forest Service employee)      Interview March 23, 2000***

I asked Joe what he knew about grazing on Adams Prairie after the US Forest Service gained control in the early 1960s. Specifically what did he know about horses owned as stock animals by Forest Service in the mid-1960s (I have a photograph of this).

The US Forest Service maintained a pack string through 1970 or 1971. During winter, the horses were kept at Adams Prairie, where the barn was available for the horses to get in out of the bad winter weather (photograph). During summer, the horses were kept at the old Agness Guard Station, where a barn and a tack room were available for use.

A bunch of wild cows that used to belong to Fred Lowry roamed the hills in this vicinity. Glenn Hensley bought the rights to these cattle at an estate auction.
Adams and Lowry's pigs still ran across these lands.
Every spring sold hay off top of Adams Prairie for 6 to 8 years. Joe came in 1968.

Sutherland has waterline into Tom East Creek. So do the owners of the little cabin just upstream from mouth of Tom East Creek. These water rights are in the property grants, and apparently aren't subject to water permit requirements. I am too unfamiliar with water rights to understand and capture everything Joe was talking about with the water rights..